UNIVERSITY
OF MICHIGAN
JUL 27 1951
MEDICAL
LIBRARY

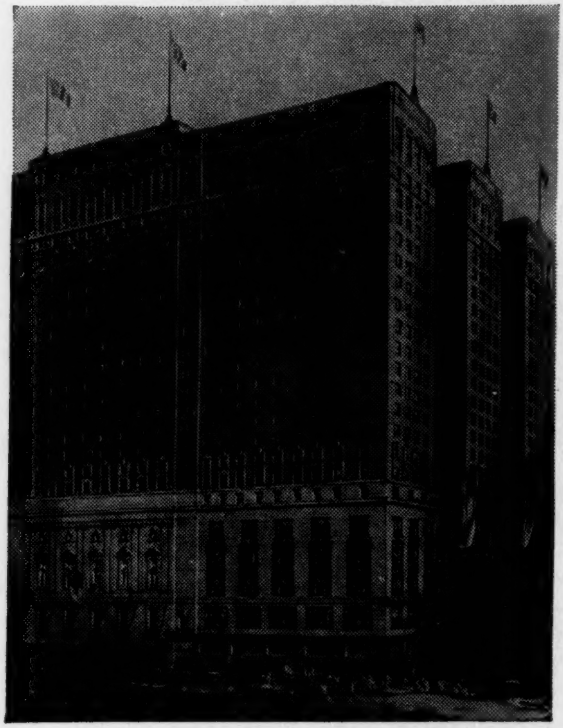
The Journal of the International College of Surgeons

FOUNDED BY DR. MAX THOREK

Vol. XVI *July, 1951* No. 1

PLAN TO ATTEND

THE SIXTEENTH
ASSEMBLY AND CONVOCATION
of the
UNITED STATES CHAPTER
INTERNATIONAL COLLEGE OF SURGEONS
IN CONJUNCTION WITH THE CANADIAN
CHAPTER
at



PALMER HOUSE—CHICAGO

Convention Headquarters

September 10 to 13 inc., 1951

For information regarding preliminary program and reservations, etc., address:

Dr. Arnold S. Jackson, Secretary
1516 Lake Shore Drive
Chicago 10, Illinois

Medical

610.5
I6
C7j

The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

Editor-in-Chief

MAX THOREK, M.D., Sc.D., LL.D., F.B.C.S., F.I.C.S., D.C.M.

Assistant to the Editor

Dorothy Langley

Summary Editors

Dr. Manuel A. Manzanilla, Mexico D. F. — Spanish
Dr. Fritz Rothbart, Chicago — German
Dr. Jean Paul Le Gault, Montreal — French
Dr. Franco Amoruso, Montreal — Italian
Dr. Sabino Vieira de Freitas, Jr., Chicago — Portuguese

Publication Committee

Custis Lee Hall, M.D., *Chairman*
Herbert Acuff, M.D.
Rudolph Nissen, M.D.
Max Thorek, M.D., *Editor-in-Chief*
Henry W. Meyerding, M.D.
Francisco Graña, M.D.

CONTENTS—JULY, 1951

Surgical Treatment of Some Cardiovascular Diseases: A New Vascular Anastomosis 1
Carlo A. Carlon, M.D., Paolo G. Mondini, M.D., and Renato De Marchi, M.D., F.I.C.S., Padua

Cardioesophageal Surgery 12
E. J. Borges, M.S., F.R.C.S., (Eng.), F.I.C.S., Bombay

Meckel's Diverticulum 22
S. J. Carnazzo, B.S., M.D., F.A.C.S., F.I.C.S., and E. J. McGreevy, B.S., M.D., Omaha

Prolapse of the Uterus: An Operation for Its Relief 37
Aaron E. Kanter, M.D., F.A.C.S., F.I.C.S., Arthur H. Klawans, M.D., and Rudolf W. Hack, M.D., Chicago

Myoepithelial Hamartoma of the Stomach Wall 48
Max Thorek, M.D., F.I.C.S., Chicago

The Surgical Approach to Glaucoma 58
Donald T. Atkinson, M.D., F.A.C.S., F.I.C.S., F.R.A.M. (Ireland), San Antonio

Preoperative and Postoperative Care in Gastric Surgery 73
S. H. Babington, M.D., F.I.C.S., Berkeley, California

Treatment of Trichomonas Vaginalis Vaginitis: II. Factors Affecting Response to Treatment 86
Walter J. Reich, M.D., F.A.C.S., F.I.C.S.; Helen L. Button, M.D., F.I.C.S., and Mitchell J. Nechtow, M.D., Chicago

Compression Fixation Arthrodesis of the Knee 93
Arthur A. Michele, M.D., and Frederick J. Krueger, M.D., Staten Island, New York

Estradiol Implants in Postoperative Pituitary Exophthalmos 98
M. V. Okie, M.D., H. B. Denee, M.D., and William Daley, M.D., Buffalo, N. Y.

Surgical Aspects of Meckel's Diverticulum 101
A. B. McGraw, M.D., F.A.C.S., Detroit.

Gallstones in Stomach Wall with Symptoms of Pyloric Stenosis: Report of a Case 105
Halit Ziya Konuralp, M.D., Istanbul, Turkey

Perforation of the Gallbladder 110
Joseph P. Cangelosi, M.D., A.I.C.S., Angelo L. Vincenti, M.D., A.I.C.S., and Edward Kalvelage, M.D., F.I.C.S., Chicago.

EDITORIALS
Iodine as a Skin Antiseptic Prior to Abdominal Operations 115

Summing Up the Summaries 116

CHAPTER NEWS 117

PRELIMINARY PROGRAM, SIXTEENTH ANNUAL ASSEMBLY, UNITED STATES CHAPTER, INTERNATIONAL COLLEGE OF SURGEONS 121

MOTION PICTURE PROGRAM 129

NEW BOOKS 130

ABSTRACTS FROM CURRENT LITERATURE 132

IN MEMORIAM 137

HOME OF THE INTERNATIONAL COLLEGE OF SURGEONS AND THE UNITED STATES CHAPTER .. 139

FOUNDED BY DR. MAX THOREK

The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

Vol. XVI JULY, 1951 No. 1

Original Articles

Surgical Treatment of Some Cardiovascular Diseases

(A New Vascular Anastomosis)

CARLO A. CARLON, M.D., PAOLO G. MONDINI, M.D., AND RENATO DE MARCHI, M.D., F.I.C.S.

PADUA

THE causes of cyanosis associated with the cardiovascular diseases of the fourth group of Abbott's classification, according to Lunsgaard and Van Slyke, are as follows: (1) the degree of oxygen saturation of the blood returning from the lungs; (2) the percentage of venous blood passing from the right to the left side of the heart by an anomalous route which does not permit normal oxygenation; (3) the total hemoglobin content, and (4) the degree of blood oxygenation in the capillaries.

Blalock's studies on the possibility of increasing the blood flow to the lungs, as well as the operation first performed by him for surgical treatment of the so-called tetralogy of Fallot and stenosis of the pulmonary artery, is too well known to require discussion here.

One of us (Carlon), studying the diagnostic and therapeutic problems encountered with cardiovascular diseases, believed it possible and much more convenient to increase this blood flow with venous blood instead of arteriovenous blood as used by Blalock. In his opinion, advantage would be served if the blood of the superior vena cava should reach the capillary region of the right lung by way of a convenient anastomosis between that great venous trunk and the arterial system of the right lung. We are not aware that anyone else has foreseen and studied the problem of oxygenation of the pulmonary blood under venous pressure and without cardiac output, but we have been supported in our experiments by the following considerations:

1. The suction of the right auricle is really no advantage, because the great quantity of blood coming by way of the

From the Surgical Clinic of the University of Padua, Prof. Dr. Galeno Ceccarelli, Director. Submitted for publication May 20, 1951.

two caval veins easily reaches the right side of the heart because of *vis a tergo* and thoracic suction during respiratory movements.

2. After the operation, we have thought that the comparatively slight suctional strength of the right auricle could have failed under the normal factors supporting the circulation in the superior vena cava.

3. It is well known that the systolic impulse decreases from center to periphery and diminishes in the capillary and precapillary passageways, where it arrives under practically continuous pressure.

4. In the region of the pulmonary artery the systolic pressure is much lower than in that of the aorta. The former varies from 20 to 30 millimeters of mercury, and the level is even lower in the presence of pulmonary stenosis.

5. It is also well known that in the venous system it is possible to verify pressure levels attaining and surpassing these values; in cases of Pick's disease, venous pressure in the cephalic or the basilic veins may reach the point of 40 to 50 cm. of water.

6. If the superior vena cava is tied and its blood shunted into the right branch of the pulmonary artery through the azygos vein, an increase in caval pressure should take place in proportion to (1) the quantity of caval blood passing through the anastomosis in a given time and (2) the resistance opposed by the pulmonary capillaries. (In our dogs the venous pressure in the jugular vein and therefore in the superior vena cava oscillated, after operation, between 10 and 15 cm. of water, which is a pressure perfectly supported by the venous system and the tissues supplied by it.

7. After the anastomosis there should be a continuous pressure *already* in the right branch of the pulmonary artery and in the arterial vessels carrying the blood therefrom.

8. The pulmonary capillaries are short and of large caliber, an anatomic condition that helps the passage of blood into the venous capillaries.

9. The rhythmic expansion and collapse of the breathing lungs are aids to circulation.

10. On expansion of the lung the blood of the capillaries should flow to the pulmonary veins, because there is very low pressure, especially during the left auricular diastole, while in the arterial precapillaries there takes place the repercussion of the increase of pressure in the vena cava; this means that at this level the physiologic conditions again approximate the normal.

With these presuppositions we began our experiments. The initial problem was to send the blood flow from the superior vena cava to the right pulmonary artery. The first type of anastomosis we tried was end-to-end, between these two vessels; but the first 2 dogs died during the operation, probably unable to tolerate the sudden closure of the vena cava.

In the third dog we tried a similar anastomosis but diverted the caval blood through the azygos vein to the femoral vein by way of a rubber tube so as to obtain sufficient drainage. This dog also died during the operation, owing to closure of the tube, which had not been sufficiently coated with paraffin. In the fourth dog we repeated the experiment, connecting the aforementioned rubber tube to Mondini's cardiopulmonary machine and heparinizing the animal. This time we succeeded. There was no evidence of cardiac failure, and the dog's blood remained perfectly oxygenated. However, when we removed the bulldog clamps from the superior vena cava and the right pulmonary artery a fatal hemorrhage occurred, starting from the point of anastomosis. Evidently the anastomotic suture had been imperfect; the caliber of the vena cava was larger than that of the pulmonary artery, and we realized that we should have "gathered" the anastomotic end of the former to match the size of the latter before uniting them. Since the suture line was imperfect and the animal had been heparinized, there was no formation of small thrombi to fill the defects in the seam. In this experiment

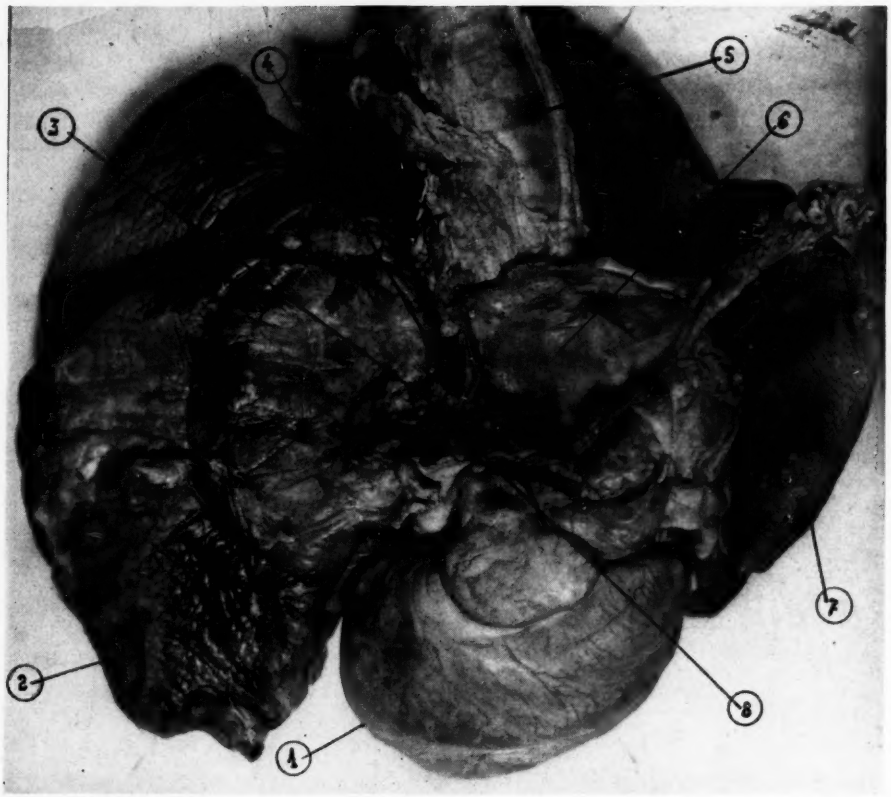


Fig. 1.—Cardiopulmonary apparatus of dog 8, which died on the eleventh day after operation because of bilateral empyema and pericarditis. *1*, right ventricle; *2*, right lung; *3*, right branch of pulmonary artery; *4*, anastomosis between the azygos vein and the right pulmonary artery; *5*, trachea; *6*, superior vena cava completely opened; *7*, left lung; *8*, ligature of the superior vena cava at its opening into the right auricle.

we noted that the caliber of the azygos vein is about the same as that of the right pulmonary artery. Therefore, in the fifth dog, we decided to use the azygos vein for the anastomosis, first tying and cutting it 3 or 4 cm. from its opening in the superior vena cava. In this way we were able to divert the caval blood, accomplishing ligation in advance of opening into the right auricle and under the end of the azygos.

We performed this anastomosis on 3 dogs and in all cases were successful. There was no cardiac failure, and the blood remained well oxygenated. There was some turgidity of the sublingual veins and the veins of the upper half of the body.

The jugular venous pressure after the operation ranged from 10 to 15 cm. of water. The lobar branches of the right pulmonary artery were full and lightly pulsating. The right pulmonary veins appeared normal.

These dogs died from three to twenty-four hours after the operation. At autopsy, in all 3 cases, it was observed that a thrombus had closed the anastomosis. We concluded that retarded circulation, the result of venous pressure, had

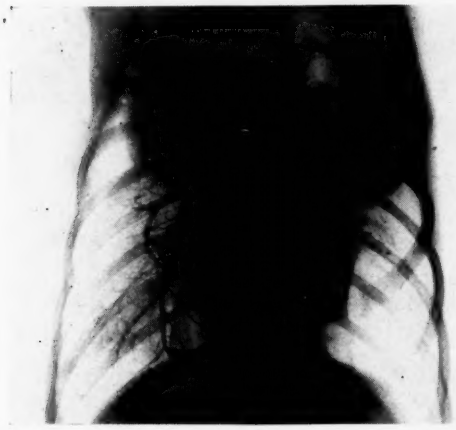


Fig. 2.—Pneumoangiograph of dog 9; third seriogram taken after injection of 40 cc. of 70 per cent pielosyl into the right external jugular vein. The intraparenchymal branches of the pulmonary artery appear perfectly filled all the way into the right lung.

favored the formation of thrombi. We were not discouraged, however, because we felt that if the anastomosis was functioning at the end of the operation, permitting the animals to recover and to survive for a certain time, it would mean that the circulatory conditions created by the anastomosis were compatible with life while the anastomosis remained functional. Therefore we decided to heparinize the animals after completing the anastomotic suture and before removing the clamps from the azygos vein and the right pulmonary artery.

We realized that this would present some difficulties. First, careful hemostasis of the thoracic wall; and second, the necessity of a perfect anastomotic suture, which would not be easy because of the fragility of the azygos wall. Nevertheless, the eighth dog tolerated the operation, returned to normal shortly after completion of the procedure and survived eleven days without showing any sign of cardiac or respiratory failure.

During the operative procedure the cuff of the tracheal tube tore while the animal was apnoic, and it was necessary to intubate the dog at once. After this the operating field was no longer sterile. Moreover, hemostasis of the thoracic wall had not been perfect, and during dissection of the vessels we accidentally damaged the right lung. The result of these surgical accidents was a pneumothorax, with subcutaneous emphysema and postoperative infection of the operative wound. On the eighth postoperative day there was inflammatory edema of the right foreleg, evidently due to secondary phlebitis, in spite of the administration of penicillin and sulfonamides. Yet on the tenth day after the operation, and only a few hours before its death, the dog went up and down three flights of stairs without any sign of cardiac failure. At autopsy, which was performed with the collaboration of Dr. Zagnoni, histopathologist in our Clinic, the opening of the thorax disclosed bilateral empyema, with several liters of pus. The pericardium showed purulent serositis, with 500 cc. of pus. There were no signs of lymphorrhagia. The anastomosis between the azygos vein and the right pulmonary artery was patent and functioning. The size and thickness of the heart were normal. We removed the heart, together with the great vessels, the lungs and the trachea (Fig. 1).

When we opened the superior vena cava we realized that its entrance to the right auricle was completely closed and that the venous wall had adapted itself to the new circulatory conditions and shaped itself like a funnel around the opening of the azygos vein.

On opening the azygos vein we noted that the anastomotic suture was completely covered by glistening endothelium. It was possible to recognize the end of the vein and the beginning of the artery because the artery was ivory white and the vein wine pink.

We performed this operation on 2 more dogs. The first of them died during angiocardiographic investigation with 40 cc. of pyelosyl at a high concentration (70 per cent). It is well known that iodine in such a concentration is fatal to dogs in most cases. The angiocardiographs showed that the anastomosis was functioning perfectly

and that the arterial system of the right lung was completely filled. In addition, the speed of circulation was almost normal; as a matter of fact, the iodine, which was perfectly visible in the right lung in the third seriogram (Fig. 2), was no longer visible in the fourth, taken only two seconds later.

The last dog operated on is still alive and apparently healthy at the time of writing. An electrocardiogram taken on the seventh postoperative day appeared almost normal. From the third postoperative day the animal has eaten, drunk and behaved quite normally. There is no sign of cerebral stasis. The dog walks up and down three flights of stairs as any normal dog would; it pants normally when in the sun, but there has been no sign whatever of pain or illness.

OPERATIVE TECHNIC

Anesthesia.—Local procaine anesthesia of the femoral vein was induced at Scarpa's triangle and a needle was inserted into the vein. Four to 6 cc. of 5 per cent pentothal sodium was injected, and a Magill tube with an inflatable cuff was placed in the trachea. Through the same needle a continuous flow of 5 per cent dextrose solution is administered. Anesthesia is maintained with ether-oxygen. Ten to 15 mg. of curarine is added at the opening of the pleura.

Procedure.—An incision is made in the fourth right intercostal space, from the sternum to the middle or posterior axillary line, the dog lying in the left lateral position. Hemostasis of the thoracic wall is made as nearly perfect as possible. (This is the most time-consuming part of the procedure, but it is also the most important; the dog should be heparinized for several days after the operation, and it is obvious that even a small hemorrhage may be dangerous, either because of the loss of blood or because of the possibility of fatal infection

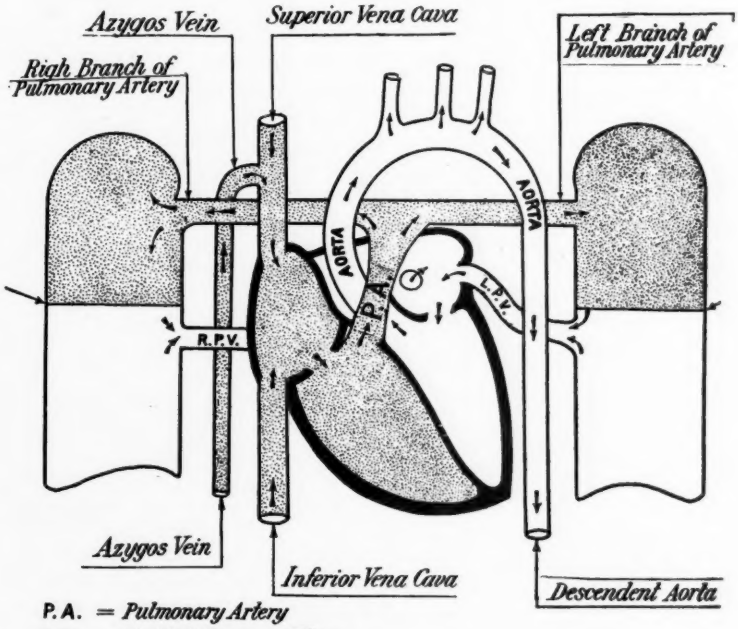


Fig. 3.—Diagram of a normal circulatory cycle. The anatomic and functional relationships of the physical structures involved are clearly indicated.

due to accumulations of blood in the pleural cavity.) When the right pleura is opened, the posterior portion of the mediastinum and the costovertebral angle are examined. The superior vena cava and the azygos vein are identified, after which the parietal pleura is incised above the azygos vein and the latter isolated by means of a forceps, tied with two heavy silk sutures and divided between them (Fig. 4). The tie nearest the vena cava is reinforced by a lighter one. The sutures are left long, thus becoming aids in isolating the azygos vein and lifting it forward and upward. This facilitates the remaining steps of the operation. When the azygos vein has been isolated, it is easy to find the branch to the upper lobe of the right pulmonary artery, which lies in the triangle limited anteriorly by the azygos vein, medially by the superior vena cava and posteriorly by the right pulmonary hilum. After this it is easy to identify and isolate the right branch of the pulmonary artery.

At this time it is a good precaution to inject (intravenously) 7 or 8 cc. of 1 per cent procaine hydrochloride. Four to 5 cc. of the same solution may be injected into the pericardium. This eliminates cardiac arrhythmia or fibrillation.

The right pulmonary artery should be

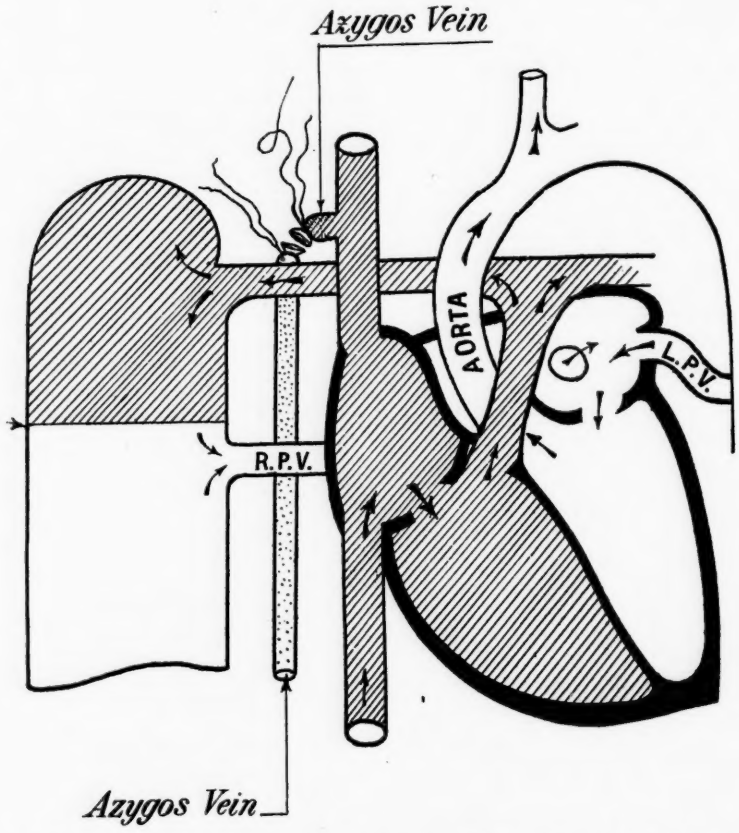


Fig. 4.—First step in the operation; isolation, tying and sectioning of the azygos vein.

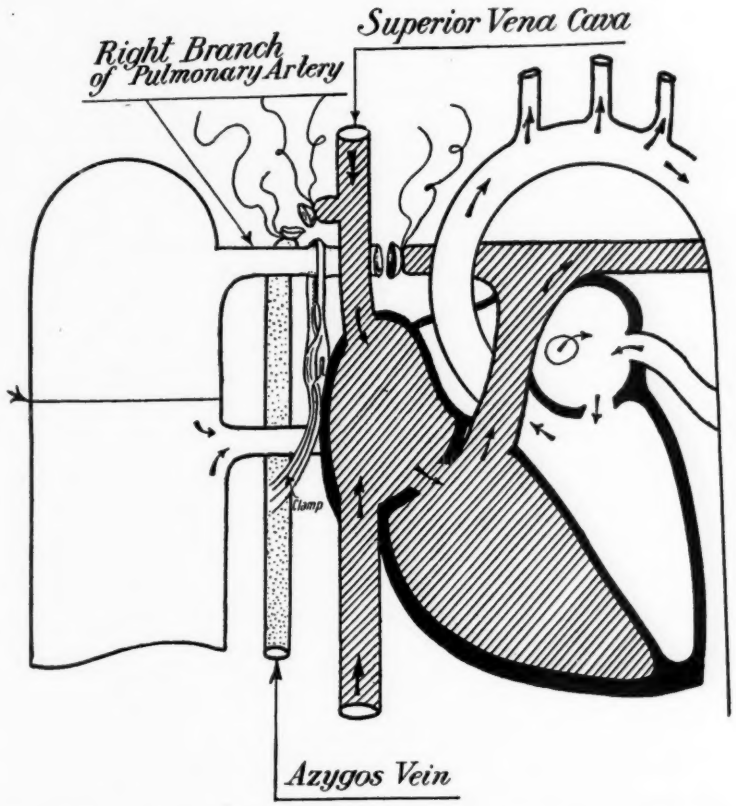


Fig. 5.—Second step in the operation; isolation, tying and sectioning of the right pulmonary artery.

isolated as far as possible and, as a rule, as far as possible behind the aortic arch, near its origin from the main pulmonary artery. At this level two heavy silk sutures are placed, as far apart as possible, on the artery. A Blalock or other clamp is placed at the introitus of the right pulmonary artery into the right pulmonary hilum, so that the vessel is compressed in a superior-inferior direction. It is then cut as close as possible to the deep ligatures (Fig. 5). The right pulmonary artery is pulled out and upward, and the adventitia is removed. A Blalock or bulldog clamp is placed on the azygos vein, close to its outlet into the superior vena cava. Care is taken to compress this vessel also in the superior-inferior direction. The vein is then ligated and its distal end cut away. It is not advisable to remove the adventitia of the azygos vein, because of this vessel's fragility.

The vein should be cut askew so that its section will be as even as possible with the section of the pulmonary artery.

The anastomosis is then performed. Everting sutures are used for all types of vascular anastomosis (Fig. 6). The suture should be placed with accuracy, for it is very easy to tear the thin wall of the azygos vein, thus causing hemorrhage after heparinization.

The anesthetist, therefore, plays an im-

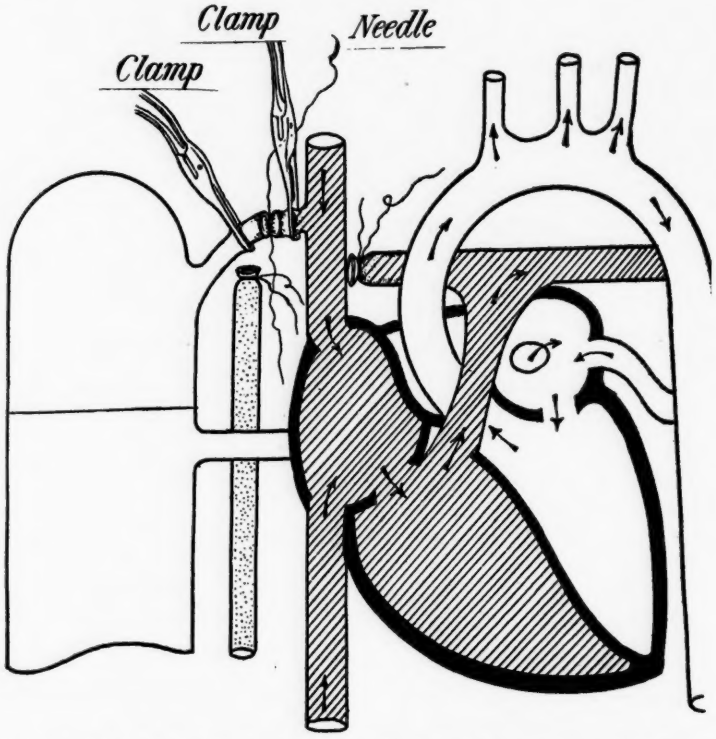


Fig. 6.—Third step in the operation; beginning of the anastomosis between the azygos vein and the right pulmonary artery.

portant role. Oxygenation should be perfect, without too much inflation of the lung on the operative side and yet with hindering the mediastinal "flottement" by insufficient oxygenation or an excess of carbon dioxide.

During the suturing of the anastomosis an assistant should frequently wash the opened vascular end with 1 per cent heparin in sodium chloride solution to hinder the drying of the intima and the formation of small thrombi.

If the anastomotic suturing is well done, there will be no hemorrhage from the anastomosis. If necessary, some U stitches may be added at the bleeding points.

The pericardium is now opened. The end of the superior vena cava is isolated under the end of the azygos vein and close to its outlet into the right auricle. A heavy silk ligature is placed slowly and carefully, with meticulous observation of cardiac function. If the dog has been given a sufficient dose of procaine hydrochloride, no arrhythmia and no fibrillation will be observed. The venous wall is then crushed and a second heavy silk suture placed under the first one *V* (Fig. 7).

The superior vena cava becomes moderately ectasic, and the jugular venous pressure rises from 10 to 15 cm. of water. The lobar branches of the right pulmonary artery appear filled and lightly pulsating; the blood pressure inside it is the same as that of the jugular vein. No difference is noticeable in the right pulmonary veins. The sublingual veins appear lightly

ectasic. When the anesthetist inflates the right lung, its color is a normal pink. The pericardium is closed with a silk suture, and fibrin sponge or oxycel is placed around the anastomosis. When it has been made certain that there is no loss of blood, penicillin and sulfonamides are put into the right side of the thorax. The thoracic wall is then sutured, a rubber tube being left to aspirate the air from the pleural cavity after its closing.

This is the standard technic used by us. If necessary, the anastomosis between the superior vena cava and the right pulmonary artery may be end-to-side.

After the operation, we administer penicillin parenterally for seven or eight days. During the same period heparin is given in the following doses: first and second days, 100 mg. twice daily; third to eighth day, 60 mg. twice daily.

We are still studying the physiologic changes produced on dogs by this operation and expect to publish our results as soon as possible. At the time of writing the dogs seem normal and are lively and strong. Their affectivity and intelligence are also normal. As a result, we are encouraged to hope for the present and future resistance of the brain to the in-

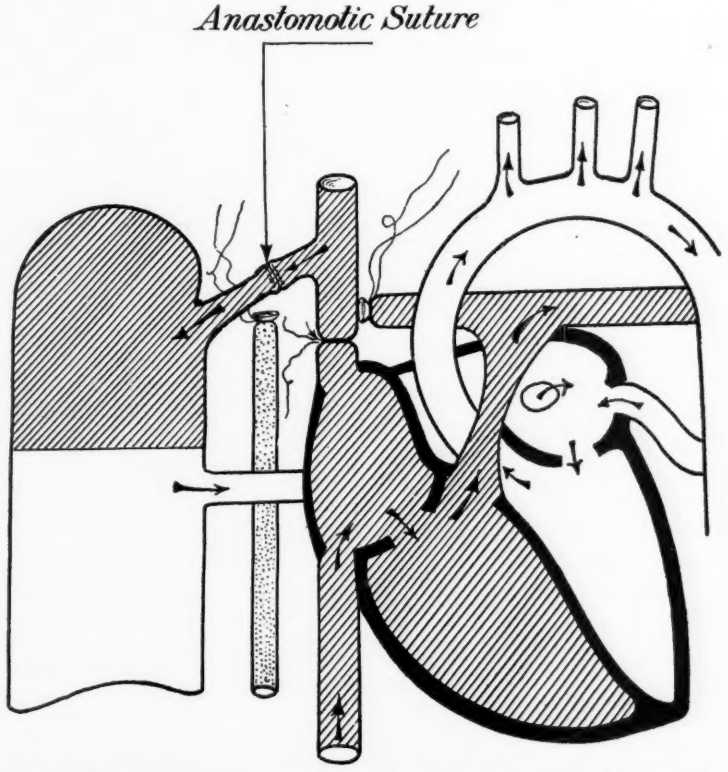


Fig. 7.—Fourth step in the operation; the anastomosis is finished, the bulldog clamps are taken off the azygos vein and the pulmonary artery. The superior vena cava is tied just short of its opening into the right auricle. Its blood passes into the right lung through the azygos vein and the right pulmonary artery and returns to the left side of the heart through the right pulmonary veins.

creased venous pressure certainly existing in the cerebral vascular area as in other areas of the upper half of the body.

SUMMARY

The authors describe a new anastomosis between the azygos vein and the pulmonary artery. These two vessels are divided, and an end-to-end or an end-to-side anastomosis is performed. The superior vena cava is freed and ligated in advance of its opening into the right auricle; thus the blood of the whole upper half of the body flows to the right lung for oxygenation. The blood then returns to the left side of the heart through the pulmonary veins, avoiding the right side of the heart. The blood flow is held up by a moderate increase of venous pressure in the upper half of the body, by thoracic suction and by the expansion and collapse of the breathing lungs. A pneumoangiograph taken of the right lung by way of the external jugular vein has proved that the speed of the blood flow remains almost the same. Autopsy performed on a dog which died on the eleventh postoperative day as a result of bilateral empyema and pericarditis has shown that the anastomosis was functioning perfectly. The anastomotic suture was completely covered by smooth endothelium. No evident alteration of the heart was to be found. In a number of dogs the operation was successful.

RÉSUMÉ

L'auteur décrit un nouveau procédé d'anastomose entre les veines azygos et l'artère pulmonaire. Les deux vaisseaux sont séparés et une anastomose bout à bout ou latérale terminale est pratiquée. La veine cave supérierure est libérée et ligaturée avant son entrée dans l'oreillette droite; de cette façon le sang de la région supérieure pénètre dans le poumon droit pour l'oxygénation. Le sang retourne ensuite dans les cavités gauches du coeur par les veines pulmonaires sans passer par le coeur droit. La circulation est maintenue par une élévation légère de la pression veineuse dans la partie supérieure du corps, une aspiration thoracique et le mouvement d'inspiration et d'expression du poumon. Une pneumoangiographie du poumon droit pratiquée dans la jugulaire externe a démontré que la vitesse de circulation du sang est constante. Une expérience sur un chien a prouvé que les anastomoses fonctionnaient bien. Un épithélium recouvrait les sutures. Il n'y avait aucune altération du coeur.

RIASSUNTO

Gli Autori descrivono una nuova anastomosi fra la vena azigos e l'arteria polmonare. I due vasi sono recisi ed un'anastomosi terminoterminale o terminolaterale viene eseguita. La vena cava superiore viene liberata ed allacciata al disopra del suo sbocco nell'auricola destra; Di tal modo il sangue dell'intera metà superiore del corpo viene diretto nel polmone destro per ossigenazione. Il sangue poi ritorna nel cuore sinistro attraverso le vene polmonari, evitando la porzione destra del cuore. La corrente sanguigna é sostenuta con un lieve aumento della pressione venosa nella metà superiore del corpo, a mezzo di aspirazione intratoracica e a mezzo di espansione e collasso dei polmoni durante le fasi respiratorie. La pneumoangiografia del polmone destro presa via giugulare esterna ha dimostrato che la velocità della corrente sanguigna rimane pressappoco uguale. L'autopsia eseguita in un cane deceduto nell'undicesimo giorni postoperatorio a seguito di empiema bilaterale e pericardite ha dimostrato che l'anastomosi funzionava perfettamente. La sutura anastomotica era completamente epitelizzata. Non furono rilevate evidenti alterazioni cardiache. In un certo numero di cani l'operazione é stata favorevole.

ZUSAMMENFASSUNG

Die Verfasser beschreiben eine neue Anastomose zwischen der Vena azygos und der Pulmonalarterie. Die beiden

Gefaesse werden durchschnitten und eine End-zu-End- oder End-zu-Seitanastomose wird ausgefuehrt. Die obere Hohlvene wird vor ihrer Einmuendung in den rechten Vorhof freigelegt und unterbunden; auf diese Weise fliesst das Blut der gesamten oberen Koerperhaelfte in die rechte Lunge zur Oxygenisierung. Dann kehrt das Blut unter Umgehung der rechten Seite des Herzens durch die Lungenvenen in das linke Herz zurueck. Der Blutstrom wird aufrechterhalten durch ein maessiges Ansteigen des venoesen Druckes in der oberen Koerperhaelfte, durch die Ansaugungskraft der Brusthoehle und durch Ausdehnung und Kollaps der atmenden Lungen. Ein auf dem Wege der aeusseren Jugularvene g e w o n n e n e s Pneumoangiogramm der rechten Lunge beweist, dass die Geschwindigkeit des Blutstromes fast unveraendert bleibt. Die Obduktion eines am elften Tage nach der Operation an einem beiderseitigen Empyem und Perikarditis eingegangenen Hundes zeigte ein einwandfreies Funktionieren der Anastomose. Die Naht der Anastomose war voellig von glattem Epithel gedeckt. Das Herz zeigte keine Veraenderung. An einer Reihe von Hunden war die Operation erfolgreich.

RESUMEN

Se describe una nueva anastomosis entre la vena acigos y la arteria pulmona. Se dividen estos dos vasos y se efectúa una anastomosis términoterminal o una términolateral. Se libera y liga de antemano la vena cava superior antes de su desembocadura en la aurícula derecha; en consecuencia la sangre de la mitad superior completa del cuerpo fluye al pulmón derecho para oxigenación. Entonces, la sangre retorna al corazón izquierdo por las venas pulmonares, evitando el corazón derecho. Se mantiene la corriente sanguínea por un moderado aumento de la presión venosa en la mitad superior del cuerpo, mediante succión torácica y expansión y colapso de los pulmones respirando. Se ha probado por pneumografía del pulmón derecho, obtenida a través de la yugular externa, que la velocidad de la corriente sanguínea permanece casi la misma. La autopsia de un perro muerto al undécimo día postoperatorio por empiema bilateral y pericarditis mostró que el funcionamiento de la anastomosis era perfecto. Sutura anastomósica cubierta completamente de epitelio liso. Ninguna alteración cardíaca evidente. Operación satisfactoria en numerosos perros.

SUMÁRIO

Os autôres descrevem uma nova anastomóse entre a veia aztgos e a artéria pulmonar. Esses dois vasos são divididos e uma anastomose termino-terminal ou termino-lateral é executada. A veia cava superior é liberada e ligada antes de sua abertura na auricula direita; assim o sanque de toda a metade superior do carpo cárre para o pulmão direito para oxigenação. O sanque vólta então ao lado esquerdo do corcação, atravéz das veias pulmonares, ladeando o lado direito do coracão. O fluxo sanguines é mantido por um moderado aumento da pressão venósa na metade superior do corpo, pela succão toracica e pela expansão e colapso dos pulmões em atividade. Uma pneumoangiografia tomada do pulmão direito por meio da veia jugular externa provou que a velocidade do fluxo sanguineo permanece a mesma. A autopsia praticada em um cachõrro que morreu no decimo primeiro dia como resultado de um empiema bilateral e pericardite demonstrou que a anastomóse estava funcionando perfeitamente. A sutura anastomótica estava completamente coberta por epitélio liso. Nenhuma alteracão evidente do coração era de se esperar fôsse e n c o n t r a d a . Em certo numero de cães a operação foi coroada de sucess.

Cardioesophageal Surgery

E. J. BORGES, M.S., F.R.C.S. (ENG.), F.I.C.S.
BOMBAY

IN recent years great advances have been made in surgical treatment of the esophagus and the cardiac portion of the stomach. This region long suffered from surgical neglect because of the difficulties inherent in surgical approach and the high mortality formerly associated with operative procedures therein. It is small wonder, therefore, that although the first successful operation for removal of cancer of the thoracic portion of the esophagus was performed by Torek[1] in 1913, there was little notable progress in this field until 1938, when Adams and Phemister[2] reported the first successful resection of the esophagus with esophagogastric anastomosis performed by the thoracic route. Advancement in anesthesiology and improvements in surgical care and technic have resulted in such rapid progress in the last few years that already operations on the esophagus and the cardiac portion of the stomach are a matter of routine in many clinics. It is the purpose of this paper to record my experience and that of my co-workers with surgery of the cardioesophageal region.

Diagnosis.—The commonest lesion of this part that requires surgical intervention is carcinoma. So much depends on the early diagnosis of this disease that a few words about diagnosis and mistakes likely to be made will not be out of place. Three types of errors have occurred in my experience:

1. Carcinoma of the lower end of the esophagus has often been mistaken for cardiospasm. Although the roentgenographic features of cardiospasm and cancer are usually quite distinct, occasionally a carcinomatous stricture at this region may resemble cardiospasm; it may even respond for a while to antispasmodic treatment. This mistake can be avoided only by questioning a diagnosis of cardiospasm in all patients over the age of 45, and insisting on esophagoscopic examination, for these and for all patients with a history of "spasm" of short duration.

2. Carcinoma of the cardiac portion of the stomach has trapped many a physician and roentgenologist. First, the patient has some dysphagia. The roentgen features are those of cardiospasm. The esophagoscope reveals a spastic condition of the cardiac sphincter. The patient is treated as for cardiospasm. He returns later with advanced carcinoma invading the esophagus from the stomach. Second, the patient has no dysphagia, but has anemia, loss of appetite and progressive loss of weight. A barium meal study is done and no abnormality is detected in the stomach. He is treated for anemia until time discovers an advanced carcinoma. Third, the patient complains of pain in the retrosternal or pectoral region. There is no dysphagia. There may be anorexia and progressive loss of weight. He may go to the cardiologist, or after a gastric lesion is excluded by a barium meal he may be treated for chronic cholecytitis, flatulence, etc., until too late. These mistakes are made because the roentgenologist who is prepared to discover a lesion in the distal part of the stomach is not always alert to uncover a lesion in the cardiac and fundic regions of that organ. More careful study of the gastric gas bubble and careful filling of this part with barium in all cases in which a barium meal study is undertaken by the roentgenologist would prevent these mistakes.

3. Sometimes a very early lesion in the esophagus may produce dysphagia but may not be demonstrable by roentgen studies; patients with such lesions are often passed as normal after barium

From the Department of Surgery, Tata Memorial Hospital, Bombay.
Read at the First Assembly of the Indian Chapter of the International College of Surgeons, Bombay, Sept. 30, 1950.
Submitted for publication Nov. 27, 1950.

fluoroscopic study and return later with advanced carcinoma. It is necessary to insist on an esophagoscopic examination in all cases of persistent dysphagia, even if the barium swallow shows no lesion. In this way we discover at least 2 cancers of the esophagus every year in patients who have been quite correctly passed as normal by the roentgenologist.

Another mistake that can be made is illustrated by the following curious experience. A man aged 45 years was referred to us with a diagnosis of carcinoma of the lower end of the esophagus. Screening during a barium swallow revealed an obstruction and irregularity of the barium column at that level, which led the roentgenologist to confirm the diagnosis (Fig. 1). Esophagoscopic study, however, disclosed a metallic foreign body. A plain skiagram without barium clearly outlined an image of the Hindu god Dattatraya (Fig. 2). It was only after this discovery that the patient remembered having swallowed the image in a fit of insanity he had passed through several months before. He had forced the image down his throat and proclaimed to the world that he had swallowed God. Nobody believed him. When he recovered from his mental ailment he had completely forgotten about the incident. The brass image (Fig. 3) was removed by thoracotomy and incision of the esophagus; the esophageal wound was sutured in two layers and the chest closed with drainage. His recovery was uncomplicated, and he was well two years later except for a mild stricture.

Obstruction caused by foreign bodies and simulating cancer is not a very rare experience. Several cases have been recorded of dentures swallowed unconsciously during sleep, only to be discovered several months later, after investigations for dysphagia had been instituted.

It is necessary to emphasize that all foreign bodies in the thoracic portion of the esophagus, if they have sharp or angular edges, should be removed by direct incision. Fatalities have occurred,

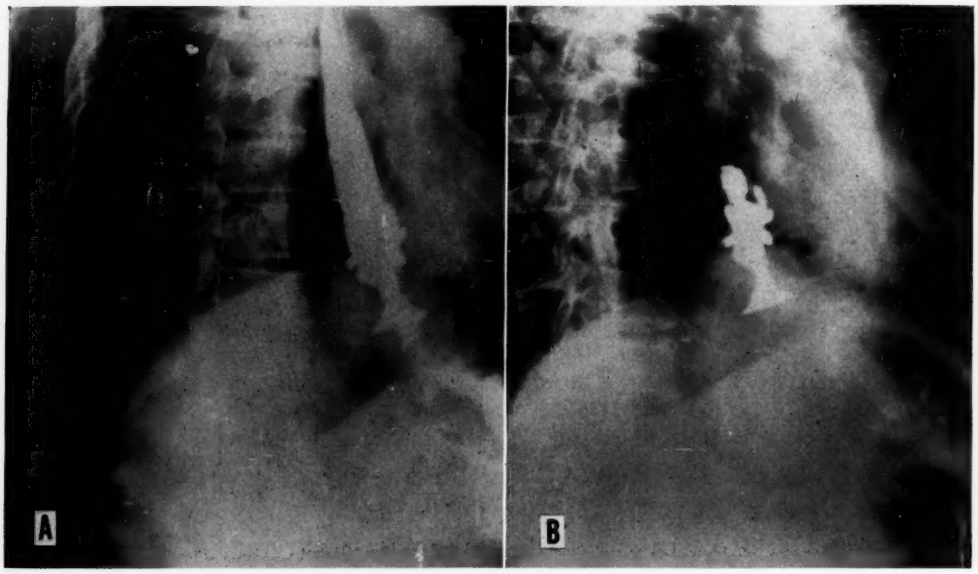


Fig. 1.—*A*, skiagram taken after ingestion of barium. Obstruction and irregularity were observed at lower end of esophagus, which on fluoroscopic examination was mistaken for carcinoma; outline of foreign body is visible on skiagram. *B*, skiagram of chest in oblique position, showing metal figure in esophagus.

though usually they are not reported, after attempts to remove dental plates through the esophagoscope, causing hemorrhage or mediastinitis.

Cardiospasm.—In the majority of cases, cardiospasm can be successfully treated if proper use of the hydrostatic dilator is carried out. However, there are some patients who do not respond or relapse frequently, and for these surgical measures offer a successful method of treatment. Cardiospasm of long duration or associated with marked dilatation, tortuosity and elongation of the esophagus is not suitable for dilatation, and should primarily be treated surgically.

Three procedures have been tried by us: Esophagogastrostomy, cardioplasty and cardiomyotomy, in chronologic order. We have come to the conclusion that cardiomyotomy is the simplest and best procedure. Esophagogastrostomy is suitable for patients in whom the esophagus is much dilated and elongated (so-called mega-esophagus) and a pouch of esophagus hangs down below the level of the constriction. Both this operation and cardioplasty (longitudinal incision and transverse suture) take more time and involve opening the stomach and the infected esophageal lumen. Cardiomyotomy can be quickly and aseptically performed. The operation consists in incising the muscle coat longitudinally after the manner of the Ramstedt operation for pyloric stenosis in infants. We prefer the transthoracic route. The diaphragm must be opened and the wound continued into the hiatus. It is important that the longitudinal incision over the constriction should go through all the musculature right up to but not through the mucosa, and that the incision should go up for at least 2 inches (5 cm.) over the dilated esophagus and down for the same distance over the stomach. Contrary to what is usually described in textbooks, I have found in all the 5 cases operated on that the constriction in the esophagus started about 1½ inches (3.2 cm.) above the hiatus, at which point the dilated esophagus suddenly tapered to the size of the little finger and continued thus for about 2 inches (5 cm.) to the stomach. In these 5 cases there was no mortality. Except for the first patient who underwent esophagogastrostomy and who has slight discomfort on swallowing, a perfect result was obtained in all instances.

Cardioesophageal Carcinoma.—There is only one curative treatment for carcinoma of the cardioesophageal area, and that is operative excision. That irradiation is futile has been proved conclusively by the experience of clinics all over the world.[3] Surgical intervention, therefore, should be offered to all patients who are fit for operation.

In our early cases two-stage operations were performed. Preliminary exploration of the abdomen was done to establish operability from that aspect, and a temporary jejunostomy was established. The jejunostomy served the dual purpose of feeding the patient preparatory to the major procedure, and maintaining nutrition and nitrogen balance in the immediate postoperative period when food was withheld by mouth. I was soon dissatisfied with this two-stage approach, for the following three reasons: 1. Many patients continued to deteriorate in general condition in spite of adequate jejunostomy feedings. 2. Incidental postoperative complications sometimes delayed the second stage indefinitely. 3. In many cases, at the second stage the thoracotomy revealed an inoperable lesion in the thorax; the chest had to be closed and a gastrostomy established and the jejunostomy allowed to close. This meant waste of time and valuable bed space.

Two-stage operations were therefore given up in favor of a one-stage procedure. The abdomen was first explored through an epigastric incision, which was closed as soon as operability was established from the abdominal aspect. The patient was then turned over on his right side and a thoracotomy was performed for exploration and excision. It was a short step from this to the abdominothoracic exposure popularized by Garlock.[4] The patient is placed in the right lateral position for thoracotomy. The table is first

tilted toward the left to expose the epigastrium. A transverse incision is made in this area, sufficient to allow palpation of the liver and the paracardiac region. The incision is then carried across the costal margin into the seventh or eighth intercostal space and the chest opened. The costal cartilage is cut across in line with the incision and the diaphragm incised in the same line, so that when the incision is completed there is one continuous abdominothoracic wound which gives excellent exposure and access to the viscera in that region. However, the incision has certain drawbacks, which began to reveal themselves after we had used it a few times. Closure of the abdominothoracic wound takes considerable time, a distinct disadvantage in a difficult case when the operation has been more prolonged than usual and a rapid closure is required. We have also found some difficulty in approximating the costal margin accurately; there is always a tendency to overriding, and in some cases the costal cartilage has necrosed and led to an annoyingly persistent sinus.

For these reasons, in the last 2 cases I have used the purely thoracic approach after a preliminary abdominal exploration through a small vertical epigastric incision, which is quickly closed. The seventh or eighth rib is resected, and an exposure as good as the abdominothoracic is obtained if one or two ribs above or below the resected one are cut across behind and the intercostal vascular bundles ligated and severed. This wound can be rapidly closed, and trouble at the costal cartilage margin is avoided.

Space is not sufficient to discuss the details of technic of esophageal resection; therefore, only the salient features of the operation and the postoperative care will be touched upon.

Anesthesia.—The intratracheal carbon dioxide absorption technic with cyclopropane and ether is used. After the pleura is opened the anesthetist restors to controlled respiration.

Resection and Anastomosis.—The mediastinal pleura is incised to the right of the aorta; the esophagus is exposed, the tumor palpated, and the patient's operability assessed. In the early stages the tumor-bearing esophagus is easily isolated, but in most cases a fair amount of active dissection must be carried out to free the esophagus. A prolonged dissection to separate a markedly adherent esophagus is hardly justified, as experience shows that in these cases recurrence is the rule.

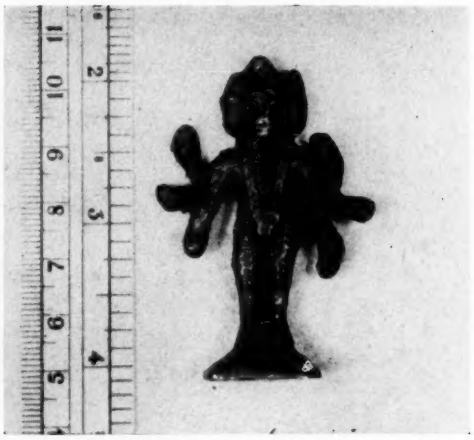


Fig. 2.—Photograph of brass image of Hindu god Dattatraya, removed from esophagus by thoracotomy.

In lesions at the hiatus it is advisable to leave a ring of diaphragmatic tissue around the esophagus when the diaphragm is incised and the stomach delivered into the thorax. The short gastric arteries in the gastrosplenic ligament are ligated along the upper third of the greater curvature, the right gastroepiploic being strictly preserved. The left gastric artery is then tied at its origin, care being taken to avoid ligating the celiac axis instead. All lymph nodes around the artery and at the superior border of the pancreas are swept up with the artery. With the ligation of the left gastric and short gastric arteries, the stomach can easily be displaced into the thorax, but in an occasional case it may be necessary to

mobilize the stomach further, and even the duodenum, to prevent tension on a high anastomosis or kinking of the bile duct. After the tumor and the stomach are mobilized the stomach is severed. A dePetz clamp is preferred because it crushes and seals the cut edges with clips simultaneously and so saves time in a lengthy operation. As much of the fundus as possible should be preserved to supply an elongated gastric stump to reach well up into the chest. This is anchored to the posterior surface of the esophagus a little above the proposed line of section. It is more difficult to place these posterior sutures after the esophagus is sectioned, because the esophagus shrinks upward to some extent after the pull on the tumor-bearing segment is gone. Clamps for closing or holding the esophageal stump are not advisable because they may damage the precarious blood supply of the organ. The esophagus should be sectioned at least 2 inches (5 cm.) above the palpable upper limit of the disease, as submucous extensions of tumor are common. When adherence to this principle would involve leaving too short a stump for an infra-aortic anastomosis it is permissible to sever the esophagus a little above the tumor, because a supra-aortic anastomosis carries with it a definitely higher mortality rate.

After a rubber-covered clamp is placed on the stomach to prevent leakage, an incision 1½ inches in length is made opposite the cut end of the esophagus that has already been anchored to the anterior wall of the stomach. Interrupted cotton through-and-through sutures are placed close together all round, uniting the esophageal and gastric stomas. These sutures should be meticulously applied; on them depends the integrity of the suture line, there being no serous coat to the esophagus to seal the junction. A few transverse mattress sutures are used to bring the stomach well over the suture line. Vertical sutures do not hold on the longitudinal loose bundles of esophageal muscle. A graft of omentum is placed on the anterior aspect of the anastomosis for added security. The stomach is then anchored to the pulmonary ligament and the mediastinal pleura so as to relieve any tension on the suture line. In my own cases I have not anchored the stomach to the edges of the diaphragmatic wound except in the first case. As we do not crush the phrenic nerve to paralyse the diaphragm temporarily because we believe it might interfere with early and complete expansion of the lung, I am not in favor of attaching the stomach to the active diaphragm. There is risk of undue pull on the anastomosis with every diaphragmatic movement. If the diaphragm is snugly closed around the stomach there is little danger of herniation of abdominal contents. The thorax is closed, with drainage.

Postoperative Care.—The function of the drainage tube is to insure early lung expansion of the lungs and later to provide a channel to the exterior in case there is leakage at the anastomosis. To secure early lung expansion the tube is connected to a continuous suction apparatus of the Wangensteen type for the first twenty-four hours. The tube is usually removed on the sixth day.

We have now given up the indwelling gastric tube passed through the nose. To avoid frequent blocking the tube has to be large; it causes annoyance to most patients, may cause pressure necrosis at the anastomosis and, in our experience, tends to induce respiratory complications. After a forty-eight-hour period of starvation, during which the fluid and electrolyte needs of the patient are satisfied by parenteral infusions, the patient is allowed to take small quantities of nourishing fluids by mouth at hourly intervals. These help in washing down mucus and clots that adhere to the suture line and are potential sources of local infection. Soft solid diet is started on the sixth day and solid nongritty food from the tenth day.

The patients experience no difficulty in swallowing after the operation (Figs. 4 and 5), but a certain degree of anorexia and a sense of fullness after meals persist

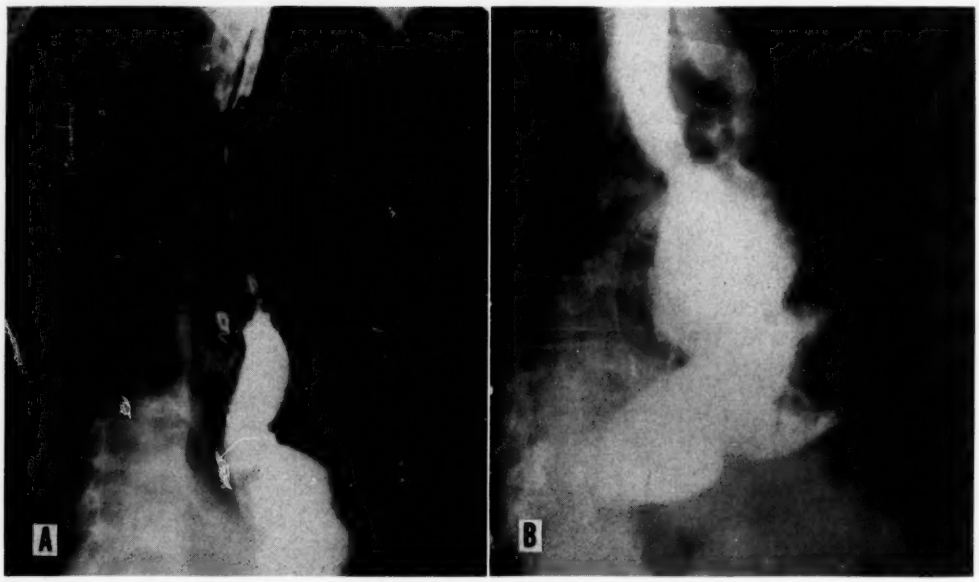


Fig. 3.—Skiagrams taken during ingestion of barium, showing esophagogastric anastomosis in thorax. Part of stomach is seen in thorax. Below and behind stoma are seen metal clips of de Petz clamp used to crush and suture stomach.

for some months. The absence of a sphincter at the anastomosis permits gastric contents to flow into the esophagus and occasionally regurgitate into the mouth if the patient lies down after a meal.

Clinical Material.—Since 1945 there have been 23 esophageal resections performed at this hospital. Six of these were resections of the Torek type, with the esophageal stump brought out into the neck. Three patients survived the operation. Resection with anastomosis of the esophagus to the stomach in the thorax was done in 17 cases. Eight of the patients survived. Thus, of a total of 23 patients undergoing resection, 11 survived the operation and went home, giving a mortality rate of 52 per cent. This rate appears high because it includes our earlier cases. With increased experience the mortality has been considerably decreased. Since January 1950 seven resections with anastomosis have been done with 2 deaths, a mortality rate of 28 per cent. My personal series of esophageal resections consists of 8 (2 of the Torek type and 6 with anastomosis) with 2 deaths (mortality rate 25 per cent). One of the deaths occurred from shock twelve hours after the operation; the patient had undergone a supra-aortic anastomosis after prolonged dissection in an adherent neoplasm of the midesophagus. The second death was the result of a tension pneumothorax of the opposite pleural cavity in a patient with chronic bronchitis and emphysema apparently caused by a ruptured bulla of the lung.

A study of the cases reveals several interesting features:

1. Three of the 4 female patients in the group survived. The one who died had a supra-aortic anastomosis; death was due to cardiac failure thirty hours after operation. Women seem to stand the operation better than men.

2. The ages of the patients ranged from 30 to 73 years. Two patients aged 63 and 73 years respectively (ages which

correspond as regards vitality to 73 and 83 in Western countries) survived the operation without any shock. Advanced age, therefore, should not deter the surgeon.

3. Among the survivors were 3 patients who were considered comparatively poor surgical risks and were subjected to operation because the growths presented features unusually favorable for resection.

4. All except 3, who were found to have resectable tumors on exploration had symptoms of less than three months' duration. The maximum duration for a resectable tumor was five months.

5. The operating time was from two to five hours.

6. Postoperative complications: A severe degree of shock occurred in only 4 of the 23 patients, and all these 4 died from two to eighteen hours after the operation. There was no postoperative shock in 9 patients and a moderate degree of shock in 10.

Most of the deaths were the result of cardiac failure on the second, third or fourth day. This operation appears particularly taxing to the cardiac reserve, and the patient's cardiac status must be carefully assessed before operation. The mortality is higher among those in whom a supra-aortic anastomosis is performed.[5] In the 3 cases of resection and supra-aortic anastomosis in our series there were two deaths, 1 from shock and 1 from cardiac failure.

Results.—The ultimate results are difficult to assess, as so many of our patients have been recently operated upon. One patient has been alive and well for two and one-half years; 1 lived for the same period before succumbing, and 6 have been alive and able to swallow well for periods varying from three to ten months. One was alive and well for six months and then was lost sight of.

When one compares these results with the results of roentgen therapy[3a, c] the superiority of surgical treatment is obvious. With roentgen therapy 67 per cent of patients die within six months of the diagnosis,[3c] and 98 per cent die within one year. Of over 500 patients treated by irradiation at this hospital we have only 2 who have lived for more than five years and only 2 patients who survived for more than two years. With earlier diagnosis of cancer and increasing experience in the surgical handling of the cardioesophageal region, there is every reason to expect a lower mortality and a higher salvage rate in time to come.

SUMMARY

1. Three common mistakes are made in the diagnosis of cardioesophageal cancer. 1. It is mistaken for cardiospasm. 2. Cancer of the cardiac part of the stomach is missed by the roentgenologist, or is treated by the physician as anemia, angina pectories, cholecystitis, etc. Retrosternal pain is occasionally the first symptom and the only one for some weeks. 3. Early esophageal cancer may not show up on fluoroscopic barium studies; it may be discovered only by esophagoscopy. All these mistakes could be avoided if careful roentgen and esophagoscopic examinations were made of all patients with retrosternal or epigastric symptoms.

2. Rarely, a forgotten foreign body lodged in the esophagus may simulate cancer. These foreign bodies should be removed by thoracotomy, especially if they have sharp and angular surfaces.

3. The abdominothoracic incision is a very useful approach for cardioesophageal operations, though it has certain disadvantages.

4. The technic of cardioesophageal resection is discussed.

5. Twenty-three cases of esophageal resection performed since 1945 are recorded. There were 12 deaths. Seven resections have been done since January 1950, with 2 deaths.

6. With earlier diagnosis and increasing experience of cardioesophageal surgery the results will be better. Already results of surgical excision are superior to those roentgen therapy.

RÉSUMÉ

1. On fait habituellemente trois erreurs de diagnostique du cancer cardiooésophagien à savoir: (a) une méprise avec un cardiospasme: (b) le cancer du cardia n'est pas vu par le radiologiste ou est traité par le médecin comme de l'anémie, de l'angine, de la cholécystite. La douleur rétro-sternale est quelquefois la preuve et le seul signe du début, voire même pour quelques semaines. (c) La fluoroscopie avec ingestion de baryum n'a pas de valeur de diagnostic; seule l'oésophagoscopie peut déceler la lésion. Toutes ces erreurs grossières pourraient être évitées de justesse si l'on se donnait la peine de pratiquer un examen radiologique sérieux et d'une à tous les patients présentant des douleurs rétro-sternales ou épigastriques.

2. Un corps étranger de l'oésophage peut rarement simuler un cancer.

3. L'incision thoraco-abdominale est très utile dans la chirurgie oésophagienne.

4. L'auteur en discutes es mérites.

5. Sur 23 cas rapportés, il y eut 12 morts.

6. Les résultats devraient s'améliorer au fur et à mesure que le diagnostic précoce se fera.

ZUSAMMENFASSUNG

1. Drei bei der Diagnose des kardiooesophagealen Krebses haeufig vorkommende Fehler sind die folgenden:

a. Die Erkrankung wird faelschlich fuer einen Kardiospasmus gehalten.

b. Der Krebs der Kardia wird vom Roentgenologen uebersehen o d e r vom Arzt als Blutarmut, Angina pectoris, Gallenblasenentzuendung u s w. behandelt. Schmerz hinter dem Brustbein ist manchmal fuer einige Wochen lang das erste und einzige Anzeichen der Erkrankung.

c. Es kommt vor, dass ein frueher Speiseroehrenkrebs bei fluoroskopischer Kontrastmitteluntersuchung sich n i c h t darstellt und nur mit Hilfe der Oesophagoskopie entdeckt werden kann.

Alle diese Fehler koennten vermieden werden, wenn saemtliche Kranke mit retrosternalen oder epigastrischen Symptomen sorgfaeltig roentgenologisch und oesophagoskopisch untersucht wuerden.

2. In seltenen Faellen kann ein vergessener Fremdkoerper, der sich in der Speiseroehre festgesetzt hat, einen Krebs vortaeuschen. Solche Fremdkoerper sollten mittels Thorakotomie entfernt werden, besonders wenn ihre Oberflaeche scharf und kantig ist.

3. Der abdominothorakale Einschnitt stellt einen brauchbaren Zugangsweg in der kardiooesophagealen Chirurgie dar, hat aber auch gewisse Nachteile.

4. Die Technik der kardiooesophagealen Resektion wird eroertert.

5. 23 Faelle von Oesophagusresektion, die seit 1945 ausgefuehrt wurden, werden aufgezaehlt. Darunter befanden sich 12 Todesfaelle. 7 Resektionen wurden seit Januar 1950 ausgefuehrt, darunter 2 Todesfaelle.

6. Es ist anzunehmen, dass mit Hilfe frueherer Diagnose und mit wachsender Erfahrung auf dem Gebiete der kardiooesophagealen Chirurgie sich bessere Resultate einstellen. Schon heute sind die Ergebnisse der Chirurgie denen der Strahlenbehandlung ueberlegen.

RESUMEN

1. Se cometen tres errores comunes en el diagnóstico del cáncer cardioesofágco: a) confundirlo con el cardioespasmo; (b) omisión por el röntgenólogo del cáncer cardiogástrico, o su tratamiento por el médico como anemia, angina de pecho, colecistitis, etc., siendo que el dolor retroesternal es el primero y único síntoma de esta lesión por algunas semanas; (c) el cáncer esofágoiscopia no puede evidenciarse röntgenoscópicamente, sólo la esofagoscopia puede descubrirlo. Todos esos errores pueden evitarse si se hace un examen röntgenográfico y esofagoscópico en todos los pacientes con síntomas epigástricos y retroesternales.

2. Un cuerpo extraño olvidado y localizado en el esófago puede simular raramente cáncer. Estos cuerpos extraños

deben retirarse por toracotomía, especialmente si tienen superficies angulosas y filosas.

3. La incisión abdominotorácica es una vía muy útil para la cirugía cardioesofágica. Sin embargo, tiene ciertas desventajas.

4. Se discute la técnica de la resección cardioesofágica.

5. Se revisan desde 1945 veintitrés casos de resección esofágica. Hubieron doce decesos. Desde enero de 1950 se hicieron siete resecciones con dos decesos.

6. Con diagnóstico más temprano y mayor experiencia en cirugía cardioesofágica los resultados serán mejores. Desde luego los resultados de la excisión quirúrgica son superiores a los de la röntgenoterapia.

RIASSUNTO

1. Tre errori vengono comunemente commessi nella diagnosi del cancro cardioesofageo: (a) Esso é scambiato per cardiospasmo; (b) Il cancro del cardias gastrico sfugge al radiologo, o é trattato dall'internista come anemia, angina pectoris, colecistite, etc. Il dolore retrosternale é talvolta il primo ed unico sintomo di questa lesione per alcune settimane; (c) Gli esami radioscopici possono non dimostrare un cancro esofageo in stadio precoce che può essere scoperto soltanto a mezzo dell'esofagoscopia. Tutti questi errori potrebbero essere evitati se accurati esami radiografici ed esofagoscopie fossero eseguiti in tutti i pazienti con sintomatologia retrosternale o epigastrica.

2. Raramente un negletto corpo estraneo allogato nell'esofago può simulare un cancro. Questi corpi estranei dovrebbero essere rimossi con toracotomia specialmente se a superfici acute e taglienti.

3. L'incisione toraco-addominale é la più utile per la chirurgia cardioesofagea, però presenta alcuni svantaggi.

4. La tecnica della resezione cardioesofagea é discussa.

5. Sono menzionati 23 casi di resezioni esofagee eseguite a partire dal 1945. Vi furono 12 decessi. Sette resezioni sono state eseguite a partire dal Gennaio 1950 con due decessi.

6. Con la diagnosi precoce e la progredita esperienza della chirurgia cardioesofagea i risultati saranno migliori. Già i risultati del trattamento chirurgico sono superiori a quelli della radioterapia.

SUMÁRIO

1. Tres êrros comuns são feitos no diagnóstico do cancer cardio-esofagiano: (a) Confusão com o cardiospasmo; (b) Cancer da parte cardiaca do estomago, não visto pelo radiologista ou tratado pelo clinico como anemia, angina pectoris, cholecistite, etc. A dôr retro-esternal é ocasionalmente o primeíro e unico sintôma desta lesão por algumas semanas. (c) O cancer inicial do esofago póde não ser descobérto pelo exame fluoroscópico e ser somente descobérto pela esofagoscopia. Todos esses êrros podem ser evitados si um cuidadôso exame radiografico e esofagoscópico é feito em todos os pacientes que apresentem sintomas retro-esternais ou epigastricos.

2. Raramente um corpo extranho alojado no esofago póde simular cancer. Esse corpos extranhos devem ser removidos por toracotomia, especialmente si eles possuem superficies agúdas e angulares.

3. A incisão abdominotoracica é uma via de acésso muito util para a cirurgia cardio-esofagiana. Ela tem, contudo, certas desvantagens.

4. A tecnica da resecção cardio-esofagica é discutida.

5. Vinte tres casos de resecção esofagica executados desde 1945 são apresentados. Houve 12 mórtes. Sete resecções foram feitas desde Janeiro de 1950, com 2 mórtes.

6. Com diagnóstico precóce e crescente experiencia na cirurgia cardio-esofagiana os resultados sero melhóres. Os resultados da excisão cirurgicajá são atualmente superiores aos da radioterapia.

REFERENCES

1. Torek, F.: The First Successful Resection of the Thoracic Portion of the Esophagus for Carcinoma, J. A. M. A. 60:1533, 1913.
2. Adams, W. E., and Phemister, D. B.: Carcinoma of The Lower Thoracic Esophagus; Report of a Successful Resection and Esophagogastrostomy, J. Thoracic Surg. 7:621-632, 1938.
3. (a) Pack, G. T.: Introduction to Symposium on Cancer of the Esophagus and Gastric Cardia, Surgery 23:867-873, 1948. (b) Holmes, G. W., and Schulz, M. D.: Supra-Voltage Radiation: A Review of Cases Treated During an Eight Year Period (1937-1944), Am. J. Roentgenol. 55:533-554, 1946. (c) Raven, R. W.: Carcinoma of the Esophagus: A Clinico-Pathological Study, Brit. J. Surg. 36:70-73, 1948.
4. Garlock, J. H.: Progress in the Surgical Treatment of Cancer of the Esophagus and Upper Stomach, Surgery 23:906-911, 1948.
5. Sweet, R. H.: Carcinoma of the Esophagus and Cardiac End of the Stomach; Immediate and Late Results of Treatment by Resection and Primary Esophagogastric Anastomosis, J. A. M. A. 135:485, 1947.

The life in protoplasm is directed by a speck called a "nucleus." That is simply our name for the mystery which lives in that tiny space. Far within the nucleus, all but invisible to the most searching gaze of science, is the mechanism that can direct the birth of a new cell.

Such an intricate organism as this is a kind of separate creature. It is adapted for special functions; and it can reproduce itself, as the one-celled animals do. It could no more happen into existence than a sunflower or a camel could. It is an organized unit of life. If I see a hawk flying overhead, I know that he was once in an egg and was born. It is just as obvious that any cell was born. It must have grown out of a cell, which had grown out of a previous cell, which had grown from a previous cell. There cannot have been any gap in the series of descents since life began on the earth. Every cell, in every particle of my body, is the offspring of some previous cell.

Its origin cannot be any hit-or-miss process; a new cell cannot "just branch off somehow." Even a beet-sugar factory that man makes—a clumsy pile of apparatus for doing the simplest sort of chemical work—has to be designed by an architect with studied care. There must be complete blue-print plans, an engineer's care to have foundations solid, a builder's minute pains to have walls kept plumb and courses of brick level, expert work to make steel girders exact, expert manufacture of vats and engines, high technical skill to furnish spectroscopes and chemical reagents. If so lumbering an institution as a man-made factory requires all this provision, much more will the creating of so intricate an organism as a living cell.

The specifications for a future cell lie in the nucleus. When this receives the impulse to reproduce, its mechanism is set to work, and it operates its multitude of minute parts with an accuracy that is awesome to think of. So small is the space within the nucleus and so dim are the outlines of operations that no one scientist could ever have made out the details of that workroom. . . . Even within the nucleus all the complexities of a future organism are arranged for in only a portion of the available space—that is, in the chromosomes.

The mind cannot begin to comprehend such close packing of forces; it quits exclaiming about "marvels" or "unspeakable mysteries" because any words of wonder fall so far short of what we feel. —*Henshaw Ward*

Meckel's Diverticulum

S. J. CARNAZZO, B.S., M.D., F.A.C.S., F.I.C.S., AND
E. J. McGREEVY, B.S., M.D.
OMAHA

THE following paper is based on a survey of some 118,324 patients who were admitted to Creighton Memorial St. Joseph's Hospital, Omaha, Nebraska from 1941 through 1950. Thirty-one cases are herein reported, 5 of them in detail.

History.—According to Lichtenstein,[1] Hildamus (1598) was probably the first to observe this diverticulum. Lavater[2] reported it in 1671, Ruysch[3] in 1707 and Morgagni[4] in 1769. Littre[5] reported a diverticulum in a hernia in 1742. However, Meckel[6] was the first to publish an adequate description of this anomaly and to explain its embryologic background. He was the first to associate Meckel's diverticulum with the omphalomesenteric duct.

Incidence.—The diverticulum is found in about 2 per cent of autopsies. Christie[7] presented a pathologic study of 63 cases observed in 5,768 autopsies at Babies Hospital, an incidence of 1.1 per cent. Gray's Anatomy[8] gives an incidence of 2 per cent; Richardson,[9] of 1.5 per cent. This means that the busy practitioner probably sees in his office each week at least one patient who has a Meckel's diverticulum. However, in going over the records of 50,796 major surgical procedures performed from 1941 through 1950, we were able to find only 31 cases of Meckel's diverticulum.

The proportion of male to female patients is estimated at 3 to 1. In the cases to be reported, we found this condition present in 19 male and 12 female patients. No satisfactory explanation has ever been offered for this difference in sex incidence.

From the Department of Surgery, Creighton University School of Medicine. Submitted for publication June 14, 1951.

Anatomic Background.—Brennemann[10] has stated that there is no definite point at which the diverticulum is located on the ileum, for it has been found anywhere from 3 cm. to 3 M. from the ileocecal valve. Ordinarily it is situated 12 to 18 inches (30.4 to 45.7 cm.) from the valve in infants and up to 3 feet (91.4 cm.) from it in adults. The usual type of malformation consists of a diverticulum projecting from the free, or antimesenteric, border of the ileum and terminating as a blind pouch 1 to 3 cm. in length, with a broad base.

Embryologic Considerations.—The embryologic facts of pertinent interest may be briefly summarized: The omphalomesenteric duct, which connects the yolk sac with the intestine, begins to be obliterated in about the fifth week of fetal life. Obliteration is complete at about the seventh week. Various degrees of failure of obliteration lead to various disease entities. First, if the entire duct remains patent, a fecal fistulous opening at the umbilicus results. Second, when the distal end fails to close, intestinal mucosa is seen at the umbilicus where the secretions of the glandular elements form a discharge. Third, a retention cyst is formed if the midsection persists. Fourth, persistence of the proximal end may be seen as an outpouching of the intestinal tract, usually of the terminal portion of the ileum. This is what is commonly referred to as Meckel's diverticulum. It differs from other diverticula in that it contains all the layers of the intestinal wall. Occasionally associated with it is persistence of a fibrous stalk connecting its tip with the inner aspect of the anterior abdominal wall in the region of the umbilicus. This is the result of incomplete regression of the omphalomesenteric duct. The blood supply of the diverticulum usually comes

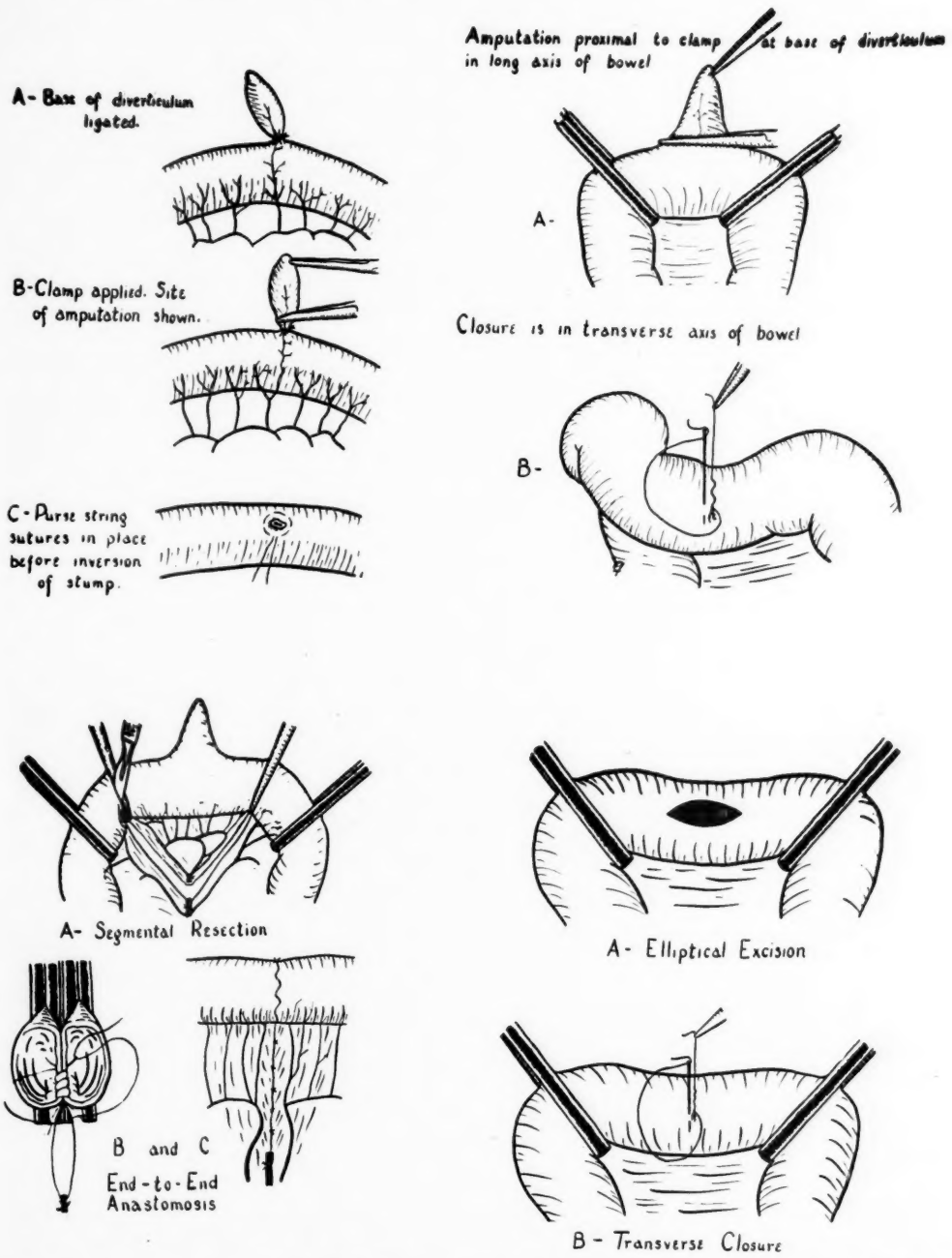

A- Base of diverticulum ligated.
B-Clamp applied. Site of amputation shown.
C-Purse string sutures in place before inversion of stump.
Amputation proximal to clamp at base of diverticulum in long axis of bowel
A-
Closure is in transverse axis of bowel
B-
A- Segmental Resection
B and C
End-to-End Anastomosis
A- Elliptical Excision
B - Transverse Closure

Fig. 1.—Four operations for Meckel's diverticulum. (1) simple amputation and purse-string inversion of stump; (2) amputation with clamp in long axis of bowel, with transverse closure; (3) wide elliptic incision about base, with transverse closure; (4) resection of portion of ileum on either side of diverticulum with end-to-end anastomosis. Third and fourth procedures are those recommended by authors, owing to high incidence of gastric mucosa in diverticulum.

from its mesentery, which arises from the mesentery of the bowel, or it may come from the bowel wall itself in some instances.

Histologic Data. — Meckel's diverticulum contains all the coats of the bowel.

Heterotopic tissues may be present in the form of pancreatic, biliary, duodenal, ileal, colonic and gastric tissues (Wilson,[11] Salzer,[12] Zencker,[13] Hunt,[14] Curd,[15] and Greenblatt, Pund and Chaney[16]). Heterotopic tissues occur in approximately 25 per cent of cases. (Matt and Timpone[17]). The most common type of heterotopic tissue found in Meckel's diverticulum is gastric mucosa. It has been conclusively demonstrated that this gastric mucosa is capable of secreting hydrochloric acid and pepsin just as does the stomach (Dragstedt[18] and Waugh, Herrell, and Crumpacker[19]). It has been shown that the gastric mucosa in Meckel's diverticulum is acted on by the secretory hormone that stimulates secretion by the mucosa of the stomach, and that the secretion in the diverticulum occurs at the same time that it does in the stomach (Greenblatt, Pund, and Chaney[16]). It has also been shown that the mucosa of the intestine becomes progressively more sensitive to the irritating properties of hydrochloric acid and pepsin as the distance from the stomach increases (Matthews and Dragstedt[20]).

Classification.—The best classification is probably that of Greenblatt[16] and his co-workers:

1. Peptic ulcer type
   a. Gastric mucosa without ulceration
   b. Gastric mucosa with ulceration
   c. Ulceration with hemorrhage
   d. Ulceration without hemorrhage
2. Obstructive type
   a. Intussusception
   b. Volvulus
   c. Congenital bands and adhesions
   d. Contents of hernia
3. Diverticular type
   a. Simple acute inflammation
   b. Perforated and gangrenous
   c. Chronic inflammation
4. Umbilical type
   a. Fecal fistula
   b. Umbilical adenoma
   c. Prolapsed intestine through fistula
5. Tumor type
   a. Benign
      (1) Carcinoid
      (2) Enterocystoma
      (3) Adenoma
      (4) Mesodermal tumor
   b. Malignant
      (1) Carcinoma
      (2) Sarcoma
   c. Heterotopic
      (1) Pancreatic
      (2) Gastric
      (3) Biliary
      (4) Colonic
      (5) Jejunal
      (6) Duodenal, etc.
6. Incidental type
   a. Normal tissue of ileum

Pathologic Picture.—It has been estimated that 15 to 20 per cent of the diverticula are subject to pathologic changes causing symptoms (Faust[21]). In other words, for every 2 diverticula found diseased, there are 8 with no symptoms.

The pathologic changes accompanying Meckel's diverticulum depend to a large extent on the anatomic deformities present:

1. If a fistula persists, intestinal contents drain to the abdomen from the umbilicus (Rentschler[22]).

2. Abdominal obstruction results from rotation of the bowel on the long axis of the diverticulum or from coils of adjacent bowel becoming looped around the diverticulum when it is attached to the abdominal wall or to some point within the abdominal cavity.

3. The cystic type is thought to result from a rotation of the bowel in early fetal life, causing a spiral twist in the long axis of the vitellointestinal duct (Callander[23]).

4. The vitellointestinal duct is usually obliterated and absorbed during the seventh week of intra uterine development (Matt and Timpone[17]). However, it

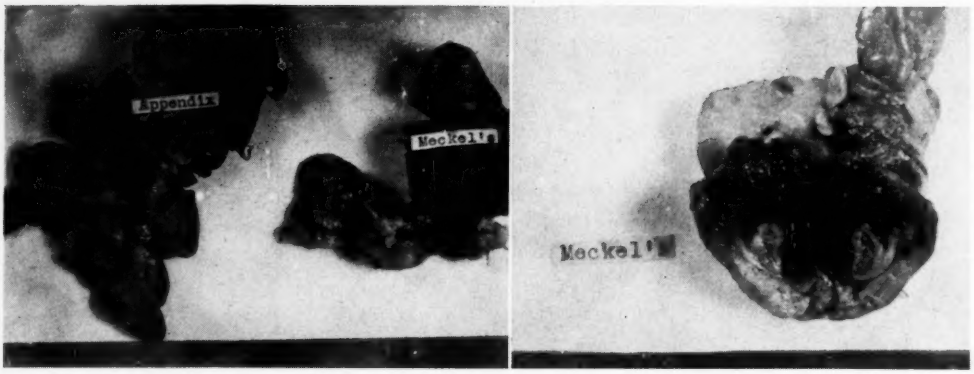


Fig. 2.—Photographs of resected specimens, after dissection. *Left*, gangrenous appendix and Meckel's diverticulum. *Right*, diverticulum opened, showing presence of gastric mucosa.

may fail to become absorbed so that a fibrous cord persists. Intestinal obstruction results from rotation of the bowel on the cord or from loops of bowel becoming twisted around the cord as described in item 2.

5. Inflammation occurs in the walls as it does in the appendix. The diverticulitis may be acute and severe, or mild and chronic; it may give rise to peritonitis.

6. Heterotopic tissue may be present in Meckel's diverticulum in the form of pancreatic, biliary, duodenal, ileal, colonic and gastric tissues (Wilson,[11] Salzer,[12] Zencker,[13] Hunt,[14] Curd,[15] and Greenblatt, Pund, and Chaney[16]).

7. Tumors occur in Meckel's diverticulum and they may be benign or malignant (Greenblatt, Pund, and Chaney,[16] Koucky and Beck,[24] Gray and Kernohan,[25] Weir,[26] Nygaard and Walters[27]).

8. Intussusception occurs from invagination of the diverticulum per se or from invagination due to the presence of a tumor (Harkins,[28] Bowen,[29] Gray and Kernohan[25]). The diverticulum may become the accidental reservoir of foreign bodies—such as: fishbones, pins, needles, grains of corn, fruit seeds, etc. (Womack and Siegert,[30] Mulsow,[31] and Giles and MacCarty[32]).

Symptoms.—The symptoms of Meckel's diverticulum are dependent upon the anatomic deformities.

1. If intestinal contents drain to the abdomen from the umbilicus, it is easy to see that a fistula persists.

2. Obstruction caused by Meckel's diverticulum does not differ essentially from intestinal obstruction or intussusception due to other causes. According to estimates of Halstead,[33] Meckel's diverticulum actually is responsible for intestinal obstruction in 6 per cent of cases. Harkins[28] in his extensive and thorough study of collected cases, found that 17 per cent of the diverticula that cause trouble do so by producing intussusception.

3. If the pathologic picture of Meckel's diverticulum is that of inflammation, the symptoms in the majority of cases resemble the various stages of appendicitis, for which it is most generally taken. Pain, when present, may be coliky and intermittent and is generally para-umbilical, as a rule to the right of the umbilicus, and may also manifest itself in the right iliac fossa. Nausea, vomiting, and constipation may or may not occur. Anorexia is more frequently observed. In many instances blood is observed in the stool, this at times being the only outstanding feature. The blood is usually dark but may be bright red and profuse. Fever, at least in the earlier stages, is rarely present.

4. Meckel's diverticulum with heterotopic tissue produces a clinical picture strikingly similar to the symptom complex

Age	Sex	Chief Complaint	Abdominal Signs	W.B.C.	Roentgen Signs	Provisional Diagnosis
38	M	Pain in RLQ for one week; nausea	RLQ tenderness +++ RLQ rigidity +++	10,800 Staff 25% Seg. 63%	None	Chronic appendicitis
28	F	Pain in RLQ for three weeks	RLQ tenderness + No rigidity	7,150 Staff 4% Seg. 55%	None	Recurrent appendicitis
21	F	Colicky pain in RLQ for one week; nausea; constipation	RLQ tenderness + No rigidity	11,050 Staff 10% Seg. 62%	None	Recurrent appendicitis
7	M	Pain in abdomen for one hour; projectile vomiting for ½ hour	RLQ tenderness ++++ RLQ rigidity ++++ Palpable mass 2 × 3 cm. in RLQ	16,750 Staff 19% Seg. 61%	None	Intussusception
14	M	Bloody stools for five months; 14 transfusions; pain in LLQ	Slight tenderness in left side of abdomen	5,500 Staff 9% Seg. 58%	Upper G. I. tract and colon normal	Polyposis of colon
32	F	Pain in RLQ intermittent for two years; nausea and vomiting; constipation	Slight tenderness in RLQ; no rigidity; no masses	9,650 Staff 3% Seg. 63%	None	Chronic appendicitis
35	F	Dysmenorrhea for one year; backache; dragging sensation in lower abdomen	Mass in lower midline, firm and slightly tender	8,200 Staff 6% Seg. 70%	None	Fibroid uterus
27	F	Pain in RLQ for two days; nausea and vomiting for two days	RLQ tenderness +++ RLQ rigidity ++++ Rebound phenomenon	14,750 Staff 7% Seg. 85%	None	Acute appendicitis
18	F	Pain in RLQ for three to four weeks; headache	RLQ tenderness + RLQ rigidity +	9,300 Staff 10% Seg. 63%	None	Subacute appendicitis
19	F	Pain in both lower quadrants	Slight tenderness in both lower quadrants; no rigidity	18,400 Staff 14% Seg. 72%	Chest normal	Subacute appendicitis
33	M	Adominal cramps; nausea and vomiting; chills	RLQ tenderness + RLQ rigidity + Distention ++	11,500 Staff 9% Seg. 58%	None	Acute appendicitis
9 mo.	M	Vomiting for four days; obstipation for three days; abdominal distention	No tenderness No rigidity Distention ++	9,650 Staff 10% Seg. 36%	Large amount of gas in bowel, extending as low as sigmoid colon	Intestinal obstruction
42	M	Pain to right of umbilicus	RLQ tenderness ++ RLQ rigidity +	8,950 Staff 7% Seg. 69%	None	Cholecystitis, recurrent
23	F	Pain in right side, low; nausea	RLQ tenderness ++ No rigidity	8,400 Staff 6% Seg. 61%	None	Acute appendicitis
50	F	Stomach trouble for 6 months; worse for past 6 weeks; vomiting everything	Tenderness + in upper abdomen	8,850 Staff 7% Seg. 52%	None	Gastric polyps
33	M	Pain in RLQ; ill for four hours; diarrhea	Tenderness ++ Rigidity ++	8,950 Staff 7% Seg. 53%	None	Acute recurrent appendicitis
46	M	Pain in LRQ; nausea; ill 24 hours	Tenderness +++ Rigidity +++	10,500 Seg. 67% Bands 13%	None	Acute appendicitis
9	M	Pain in RLQ; nausea; vomiting; ill 12 hours	Tenderness ++ Rigidity +++	10,350 Seg. 80% Bands 9%	None	Acute appendicitis
50	M	Fullness of epigastrium; anorexia; constipated; ill 3 days.	Tenderness over epigastrium; same distention; no rigidity or masses	5,800 Staff 10% Seg. 46%	Small bowel obstruction	Intestinal obstruction
28	M	Sharp pain in RLQ; radiating down rt. leg; abdomen hard as boil; ill 3 days; such attacks for 10 years, usually last only 3 hours	Slight tenderness in RLQ; no rebound	9,150 Staff 3% Seg. 51%	None	Recurrent appendicitis
33	M	Pain in RLQ 5 days; diarrhea in A.M. 3 days	Rebound tenderness RLQ; maximum tenderness 2 cm. above McBurney's point and lat.	15,700 Staff 6% Seg. 73%	None	Recurrent appendicitis

Operation	Final Diagnosis	Pathologic Report	Hospital Stay	Complications
Rt. rectus incision; purse-string suture of base after amputation; appendectomy	Chronic appendicitis; Meckel's diverticulum	Fibrosed appendix; Meckel's diverticulum	14 days	None
Rt. rectus incision; purse-string suture of base after amputation; appendectomy	Recurrent appendicitis; Meckel's diverticulum	Recurrent catarrhal appendicitis; Meckel's diverticulum	8 days	None
Rt. rectus incision; appendectomy; Connell suture of base after amputation	Recurrent appendicitis; Meckel's diverticulum	Fibrosis of appendix; Meckel's diverticulum	8 days	None
Rt. rectus incision; intussusception reduced; Connell closure after removal of diverticulum; appendectomy	Intussusception (Meckel's diverticulum), acute appendicitis	Hyperemia of Meckel's diverticulum; acute catarrhal appendicitis	9 days	None
Left rectus incision; diverticulum freed from bladder peritoneum; amputation and Connell closure of ileum	Meckel's diverticulum containing gastric mucosa	Meckel's diverticulum with ulceration of gastric mucosa	51 days	None
Midline incision; amputation of diverticulum with Connell closure of base; cholecystectomy; appendectomy	Meckel's diverticulum; diverticulum of gallbladder; chronic appendicitis	Meckel's diverticulum; chronic cholecystitis; chronic appendicitis	12 days	None
Pfannenstiel incision; suprapubic hysterectomy; left ovarian cyst enucleated; Connell (transverse clamp) to diverticulum	Fibroid uterus; chronic salpingitis; Meckel's diverticulum	Fibrosis of uterus; Meckel's diverticulum; chronic salpingitis unilateral; corpus luteum cyst	7 days	None
McBurney's incision; appendectomy; Connell suture base of diverticulum	Acute catarrhal appendicitis; inflamed Meckel's diverticulum	Acute catarrhal appendicitis; Meckel's diverticulum	8 days	None
Rt. rectus incision; appendectomy; Connell closure of base after amputation	Recurrent appendicitis; Meckel's diverticulum	Fibroid appendix; Meckel's diverticulum	6 days	None
Rt. rectus incision; appendectomy; Connell closure of base after amputation	Subacute appendicitis; Meckel's diverticulum	Recurrent catarrhal appendicitis; Meckel's diverticulum	3 weeks	None
McBurney's incision; appendectomy; purse-string suture after amputation	Acute appendicitis; Meckel's diverticulum	Acute diffuse appendicitis; Meckel's diverticulum	8 days	None
Rt. rectus incision; liberation of band causing obstruction; elliptical excision; Connell closure of base	Meckel's diverticulum	Subacute Meckel's diverticulum	11 days	None
High midline incision; cholecystomy; Connell closure after amputation	Chronic cholecystitis; Meckel's diverticulum	Chronic cholecystitis; Mickel's diverticulum	11 days	None
Rt. rectus incision; appendectomy; purse-string suture after amputation	Acute appendicitis; Meckel's diverticulum	Recurrent catarrhal appendicitis; Meckel's diverticulum	8 days	None
Rt. rectus incision; appendectomy; purse-string closure.	Chronic appendicitis Meckel's diverticulum	Obliterated appendix; Meckel's diverticulum	14 days	None
Rt. rectus incision; purse-string suture after amputation	Acute Meckel's diverticulum with recurrent appendicitis	Acute diverticulitis; Meckel's diverticulum; Fibrosis of appendix	11 days	None
Rt. rectus incision; band severed, obstruction released; Connell closure of base after amputation	Acute gangrenous appendicitis; Meckel's diverticulitis with obstruction	Acute gangrenous appendix with peri appendicitis; chronic Meckel's diverticulitis with aberrant gastric mucosa and extensive hemorrhage into wall and attached mesentery	7 days	None
Rt. rectus incision; purse-string suture after amputation; appendectomy	Bowel obstruction; acute Meckel's diverticulum; acute catarrhal appendicitis	Acute Meckel's diverticulum with band; acute appendicitis	7 days	None
Rt. rectus incision; release of obstruction and resection of terminal ileum with side-to-side anastomosis	Small bowel obstruction due to Meckel's diverticulum	Obstructive band (Meckel's) and chronic organizing peri-ileitis	30 days	Fecal fistula
Rt. rectus incision; removal of appendix and resection of Meckel's diverticulum (Connell)	Recurrent appendicitis Meckel's diverticulum	Acute catarrhal appendix; subacute Meckel's diverticulum	7 days	None
McBurney's incision; removed appendix and resected Meckel's diverticulum by clamping base; sutured with one row continuous and one row interrupted	Acute appendicitis; acute Meckel's diverticulum; gangrene of omentum	Acute diffuse appendicitis; diverticulum of small bowel with subacute inflammatory changes	9 days	None

Age	Sex	Chief Complaint	Abdominal Signs	W.B.C.	Roentgen Signs	Provisional Diagnosis
32	F	Dull intermittent pain in LLQ with superimposed periods of paroxysmal sharp stabbing pain in area (4 months); nausea and vomiting with attacks of pain; tenderness over LLQ; recent increasing pain and cramps at menstruation and passing of clots	Tender LLQ above iliac crest; no masses or rigidity	11,100 Staff 1% Seg. 50%	None	L. ovarian cyst; chronic P.I.D.; diabetes mellitus
24	M	Pain in rt. side; of two weeks' duration, intermittent; constipation	Slightly tender on deep palpation in RLQ	7,000 Staff 3% Seg. 63%	None	Subacute appendicitis
49	M	Recurrent pain in RLQ for two weeks; nausea and pain	RLQ tenderness +; no rebound tenderness	7,800 Staff 6% Seg. 49%	None	Recurrent appendicitis
22	F	Pain in RLQ; menstrual flow two weeks duration	RLQ tenderness ++ RLQ rigidity ++	14,450 Staff 3% Seg. 5%	None	Subacute appendicitis; ectopic pregnancy
43	M	Pain in right side five years	No distention, rigidity, or masses; tenderness RLQ on deep palpation	8,350 Stab 4% Seg. 47%	None	Chronic recurrent appendicitis
20	M	Pain in abdomen 24 hours; nausea and vomiting; previous attacks	Tenderness over McBurney's point	9,500 Stab 14% Seg. 59%	None	Acute appendicitis
7	M	Pain in RLQ; nausea and vomiting	Tenderness in abdomen RLQ; rigidity; abdominal distention	15,700 Staff 8% Seg. 80%	None	Acute appendicitis
79	F	Diarrhea; vomiting; Abd. distention; ill 3 days.	Tenderness LLQ; moderate distention	8,200 Stab 50% Seg. 38%	Possible small bowel obstruction	Intestinal obstruction
5	M	Drainage from abdomen; cramps; nausea and vomiting	RLQ tenderness; McBurney's scar (app.); incisional fistula	9,100 Staff 2% Seg. 61%	Opaque material in sinus show 25 × 35 mm. collective 5 cm. to rt. of midline at level of 5th L. vertebrae	Meckel's diverticulum; abdominal fistula
67	M	Pain in stomach for two days; vomiting; distention	Moderate tenderness in epigastrium; silent abdomen; no rigidity	7,900 Stab 48% Seg. 26%	Barium enema; Meckel's diverticulum	Paralytic ileus; Meckel's diverticulum

of gastroduodenal ulceration with its attending complications. Perhaps the most outstanding diagnostic criteria are melena and intestinal hemorrhage.

5. Clinically it is very difficult to make a diagnosis of tumor of Meckel's diverticulum or foreign body of the same before operation or necropsy. The most common presenting symptoms would lead to the impression of an acute pathologic lesion in the abdomen.

Diagnosis. — The correct preoperative diagnosis of Meckel's diverticulum is rarely made. Harbin[34] reported 1 correct diagnosis in 13 cases. We found the correct diagnosis was made but twice in the 31 cases reported. The symptoms vary according to the type of Meckel's diverticulum—obstructive, inflammatory, or the peptic ulcer type—and are not typical or characteristic. However, patients showing severe acute symptoms as in hemorrhage, volvulus, intussusception, gangrene and intestinal obstruction are readily recognized as having acute abdominal disease and in the vast majority of cases are well treated. Patients with chronic, intermittent, recurrent symptoms are, I believe, often poorly treated and even missed when intra-abdominal operations are performed.

Cases in Detail (Continued)

Operation	Final Diagnosis	Pathologic Report	Hospital Stay	Complications
Low midline incision; appendix removed; Meckel's diverticulum removed by clamping and 3 rows of sutures; bilateral partial oophorectomy; Gilliam suspension	Endometriosis, generalized invading sigmoid; rt. ovarian cyst; Meckel's diverticulum; diabetes mellitus	Recurrent catarrhal appendicitis; subacute diverticulum; corpus luteum and follicular cysts of both ovaries	14 days	None
Rt. rectus incision; removal of appendix; resection of Meckel's diverticulum with transverse closure	Subacute appendicitis; Meckel's diverticulum	Fibrosed obliterating appendix; Meckel's diverticulum	6 days	None
Rt. rectus incision; removal of appendix; resection of Meckel's diverticulum with transverse closure	Chronic obliterative appendix; Meckel's diverticulum	Recurrent catarrhal appendix and Meckel's diverticulum	8 days	None
McBurney's incision; salpingectomy; appendectomy; purse-string suture of Meckel's diverticulum	Ectopic pregnancy; acute appendicitis; Meckel's diverticulum	Disidual reaction with thinned fallopian tube, right; subacute salpingitis, right; Meckel's diverticulum; fibrosed appendix	14 days	None
Davis incision; appendectomy; removal of diverticulum	Recurrent appendicitis; Meckel's diverticulum	Recurrent catarrhal appendicitis; Meckel's diverticulum	8 days	None
Rt. rectus incision; appendectomy; Meckel's diverticulum removed	Acute catarrhal appendicitis; chronic Meckel's diverticulum	Acute catarrhal eppendicitis; chronic Meckel's diverticulum	5 days	None
McBurney's incision; Fibrous band attached to distal portion of Meckel's severed, thereby freeing strangulated bowel; Meckel's ligated twice at base and excess excised; appendectomy	Perforated Meckel's diverticulum; strangulation of intestines; general peritonitis	Acute catarrhal eppendicitis; Meckel's diverticulum	20 days	None
Rt. rectus incision; strangulation released; resection of part of ileum; iliotransverse colostomy	Strangulation of bowel with gangrene from Meckel's diverticulum	Acute gangrenous terminal ileum with acute Meckel's diverticulum	28 days	Expired
McBurney's incision; resection of Meckel's diverticulum; ligation at base	Meckel's diverticulum; abdominal fistula	Chronic Meckel's diverticulum with sinus through abdominal wall; gastric mucosa in Meckel's diverticulum	26 days	None
Rt. rectus incision; resection of ileum with Meckel's diverticulum and end-to-end anastomosis	Subacute Meckel's diverticulum; fibrosed appendix	Subacute Meckel's diverticulum; fibrosed appendix	27 days	None

Clinically, abdominal pain, vomiting and intestinal bleeding are the most significant diagnostic criteria of Meckel's diverticulum.

Treatment.—Treatment is surgical. It must be directed toward relieving the symptoms produced by the diverticulum. If obstruction is present it must be relieved. If intussusception is present it must be reduced surgically. If a fistula is present, it must be closed. If the diverticulum is enclosed in a hernia sac, it must be reduced. All procedures carried out for the relief of symptoms caused by Meckel's diverticulum must include excision of the diverticulum. This may be done by: (1) simple amputation and purse-string inversion of the stump; (2) amputation with the clamp in the long axis of the bowel with closure in the transverse; or (3) wide elliptic incision about the base, with transverse closure; or (4) resection of a portion of the ileum on either side of the diverticulum with end-to-end anastomosis. The second surgical procedure is recommended over the first, as it will produce less chance of obstruction from stenosis of the lumen. However, the third and fourth procedures outlined are those recommended by the authors, owing to

Fig. 3.—Photomicrograph showing gastric mucosa from diverticulum in Case 1.

the high incidence of gastric mucosa found in the diverticulum. They are particularly effective in those cases in which the base is exceptionally large. Matt and Timpone[17] and Wilson[11] stated the belief that the gastric mucosa frequently found in Meckel's diverticulum may extend to the walls of the ileum at the base of the diverticulum. It is felt that by the first two procedures some of this heterotopic tissue will be left in at the base of the diverticulum and may give rise to ulceration, perforation or hemorrhage. This obviously would not be the case if a wide elliptic incision about the base or a segmental resection and end-to-end anastomosis were done.

REPORT OF CASES

Case 1.—A 46-year-old white man entered the hospital on Dec. 30, 1950. The chief complaint on admission was pain in the lower right abdominal quadrant. The patient stated that the pain had begun on the previous afternoon. He felt nauseated at the time but did not vomit. The pain was generalized at first; later it centered in the lower right quadrant of the abdomen, with radiation into the upper right quadrant.

For several years he had complained of pain in the epigastrium coming on two to three hours after meals. Repeated roentgenograms showed no evidence of ulcer, but the patient had been following an ulcer regime.

Examination revealed him to be well developed and well nourished but apparently in acute distress. The temperature was 98.4 F., the pulse rate 84, and the respiratory rate 20. Marked generalized tenderness was present, with 3 plus tenderness and rigidity in the lower right quadrant of the abdomen. There were 10,500 leukocytes per cubic millimeter of blood, with 67 per cent segmental cells and 13 per cent band cells.

That evening the patient was taken to the operating table with a preoperative diagnosis of acute appendicitis. Spinal anesthesia was induced and the abdomen was opened through a lower right rectus incision. When the abdomen was entered, an acutely diseased, gangrenous appendix was observed, as well as a Meckel's diverticulum with an obstructing band attached to the terminal portion of the ileum. The appendix was removed in the usual non-purse-string inversion manner. The obstructing band was released, and the diverticulum was clamped at its base and removed and the opening closed with Connell No. 0 chromic sutures and reinforced with interrupted black silk. The abdomen was closed in

the usual manner, and the patient was discharged on Jan. 5, 1951.

The pathologic diagnosis was acute gangrenous appendicitis with periappendicitis; chronic Meckel's diverticulitis with aberrant gastric mucosa, and extensive hemorrhage into the wall and the attached mesentery.

Case 2.—A 7-year-old white boy entered the hospital on Dec. 18, 1943. The chief complaint on admission was severe pain in the abdomen and projectile vomiting. The patient was outside playing marbles when he was seized with a sudden severe pain in the lower part of the abdomen which "doubled him up." His mother gave him an enema, but no relief was obtained. Then he began to have projectile vomiting, which persisted for half an hour prior to admission.

Examination revealed the child to be well developed and well nourished but apparently in acute distress. The temperature was 99.6 F., the pulse rate 98 and the respiratory rate 26. Tenderness (3 plus) and rigidity (3 plus) were present in the lower right quadrant of the abdomen, with a palpable mass 2 by 3 cm. There were 16,750 white cells per cubic millimeter of blood, with 61 per cent segmental cells and 19 per cent staff cells.

Immediate operation was done, with a preoperative diagnosis of intussusception. With the patient under general anesthesia, the abdomen was opened through a lower right rectus incision. Entrance to the abdomen disclosed about 12 inches (30.4 cm.) of ileum telescoped into the cecum. After this had been reduced, a Meckel's diverticulum was found to be the initiator of the entire process. The appendix appeared acutely inflamed, and there were some rather thick adhesions over the proximal portion of the appendix and over the cecum. The appendix was removed in the usual non-purse-string inversion manner. The diverticulum was clamped and excised, and the base was closed with a Connell suture of dulox. The patient made an uneventful recovery and was discharged on December 29. The pathologic diagnosis was hyperemia of Meckel's diverticulum and acute catarrhal appendicitis.

Case 3.—A 5-year-old white boy entered the hospital on June 12, 1947. The chief complaint on admission was a draining abdominal sinus. Some three months before the patient had been operated on for appendicitis. The wound had never healed, although he was hospitalized seven weeks at that time. When he was dismissed there were three drainage sites, of which two had since closed. The mother stated that the material was at times "puslike", at times clear and at other times bloody. There had been two episodes of bleeding from the wound. During the four days just prior to admission the patient had had abdominal cramps, nausea and vomiting and had expressed a desire to stay in bed.

Examination revealed the child to be well developed and fairly well nourished, though in moderate discomfort. The temperature was 99.4 F., the pulse rate 104 and the respiratory rate 24. The abdomen presented a McBurney scar with a central fistula draining seropurulent material; there was a 2 plus reaction for tenderness in the right lower quadrant; an area of erythema 5 cm. in diameter was observed about the fistula. The leukocyte count was 9,100, with 61 per cent segmental cells and 2 per cent staff cells. Roentgenograms of the abdomen taken on June 19, after injection of opaque material into the draining sinus, showed a 25 by 35 mm. col-

Fig. 4.—Roentgenogram of Meckel's diverticulum in Case 3.

lection of the opaque medium 5 cm. to the right of the midline, at the level of the fifth lumbar vertebra.

On July 1 reoperation was performed. With the patient under general anesthesia the old McBurney scar with its central fistula was removed. The fistulous tract was followed into the abdomen. It was found to originate from a Meckel's diverticulum about 30 cm. above the ileocecal valve. The diverticulum was tied with No. 1 chromic catgut at the base and excised. Closure was routine, and the patient was discharged on July 16. The pathologic diagnosis was chronic Meckel's diverticulitis with a sinus through the abdominal wall; also gastric mucosa in the Meckel's diverticulum.

Case 4.—A 14-year-old white boy entered the hospital on May 26, 1946. The chief complaint on admission was bloody stools since December 1945. The stools had been tarry, but there had been an associated streaking with fresh red blood. No pain had been associated with the bleeding. There was a doubtful history of trauma two weeks before the onset of the bleeding. The bleeding was so severe that 14 transfusions had been required up to the time of admission.

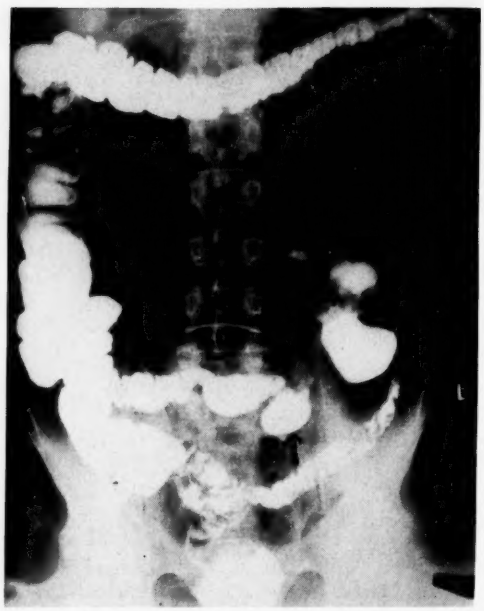


Fig. 5.—Roentgenogram taken in Case 5, showing a Meckel's diverticulum.

Examination revealed the boy to be asthenic, well nourished, and well developed, with no deformity and in no apparent acute distress. The temperature was 97.8 F., the pulse rate 88 and the respiratory rate 22. A grade III systolic murmur was present, heard best over the tricuspid area and radiating upward; a palpable thrill was heard. The red blood cell count was 2,810,000 per cubic millimeter, with 52 per cent hemoglobin. Roentgenograms of the gastrointestinal tract, both upper and lower, revealed no abnormality.

On June 20 operation was performed, with a preoperative diagnosis of melena. With the patient under general anesthesia the abdomen was opened through a lower left rectus incision. A large Meckel's diverticulum, containing a neoplasm with a diameter of 1.5 cm., was observed to be densely adherent to the bladder. The diverticulum was freed from the bladder, clamped at its base and amputated. The edges were approximated transversely (Connell suture, No. 0 chromic). An additional row of mattress sutures was then placed for reinforcement.

The pathologic diagnosis was Meckel's diverticulum with ulceration of the gastric mucosa.

Case 5.—A 67-year-old white man entered the hospital on July 23, 1950. The chief complaint on admission was gastric pain of two days' duration. On the day the pain began the patient had been nauseated and had vomited twice. The pain was steady, located in the "pit of the stomach", and did not radiate. There also seemed to be some distention of the abdomen with the pain.

Examination revealed the patient to be well developed and well nourished. He was apparently in acute distress. The temperature was 98 F., the pulse rate 68 and the respiratory rate 18. There was moderate epigastric tenderness and moderate distention were present. The abdomen was silent. The leukocyte count was 7,900, with 26 per cent segmental cells and 48 per cent staff cells. An electrocardiogram revealed no abnormality. Roentgenograms of the chest, stomach, esophagus, pylorus, duodenum and gallbladder also gave negative results. Roentgenograms of the colon revealed a Meckel's diverticulum.

On August 7 operation was performed, with a preoperative diagnosis of paralytic ileus and Meckel's diverticulitis. A general

anesthetic was employed, and the abdomen was opened through a lower right rectus incision. A large mass about 3 x 3 cm. in diameter, covered with peritoneal fat, was included in the coil of the ileum about 19 cm. from the ileocecal junction. The mass was so large and its base so extreme that resection of the coil of the ileum including the Meckel's diverticulum was carried out, with end-to-end anastomosis. The appendix was removed in the usual non-purse-string inversion manner. The abdomen was closed routinely, and the patient was discharged on August 26.

The pathologic report was subacute Meckel's diverticulitis and fibrosed appendix.

SUMMARY AND CONCLUSIONS

1. The passage of blood by rectum, especially in children and in the presence of acute abdominal disease, should arouse suspicion of a Meckel's diverticulum.

2. Examination of the terminal portion of the ileum should, when possible, be routinely undertaken in abdominal operations.

3. In an abdominal procedure in which an adequate pathologic condition is not found to explain the clinical findings, Meckel's diverticulum should be ruled out.

4. The purse-string inversion technic after amputation is to be condemned. Although this is the simplest of the four procedures outlined, it also offers the highest probability of complications. This may be expressed in either obstruction from narrowing of the lumen or hemorrhage and perforation caused by leaving heterotopic tissue behind.

5. Resection of a portion of the ileum on either side of the diverticulum is the recommended treatment of choice, owing to the high incidence of heterotopic tissue. This may be carried out either by a wide elliptic incision about the base with Connell closure or by segmental resection of the loop of the ileum containing the diverticulum with end-to-end anastomosis. The latter technic is especially applicable to cases in which the base of the diverticulum is so large that any other choice would produce a stenotic bowel, as was the situation in the case diagnosed by roentgen examination.

RÉSUMÉ ET CONCLUSIONS

1. La possibilité d'un diverticule de Meckel doit être soupçonnée quand il y a du sang dans les selles surtout chez les patients qui présentent un abdomen aigu.

2. L'iléon terminal doit subir l'examen de routine.

3. On doit ignorer la possibilité du diverticule de Meckel si les constatations opératoires ne coincident pas avec les symptômes cliniques.

4. La suture en bourse après l'opération doit être proscrite. Même si cette méthode est la plus facile, elle est cependant celle qui donne le plus de complications dûes à une sténose de la lumière, une hémorragie ou une perforation par les ligatures.

5. On recommande de réséquer une portion de l'iléon à cause du tissu hétérogène. On peut faire une incision en ellipse de la base avec fermeture Connell ou réséquer un segment d'insertion ou retourner le diverticule en terminant par l'anastomose bout à bout. Cette dernière méthode s'applique surtout pour les grands diverticules où le danger de sténose est très grand, tel que dans le cas ici discuté.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

1. Rektale Blutungen—besonders bei Kindern und bei akuten Baucherkrankungen—sollten den Verdacht auf ein Meckelsches Divertikel erwecken.

2. Das distale Ende des Duenndarms sollte, wenn moeglich, regelmaessig bei allen Bauchoperationen untersucht werden.

3. Wenn bei e i n e r Bauchoperation keine das klinische Bild erklaerenden pathologischen Befunde erhoben werden koennen, sollte das Bestehen ein Meckelschen Divertikels ausgeschlossen werden.

4. Die Einstuelpungstechnik mit Hilfe der Tabaksbeutelnaht nach Amputation

ist zu verwerfen. Obgleich diese Methode von den vier dargestellten die einfachste ist, so birgt sie doch gleichzeitig die h o e c h s t e Wahrscheinlichkeit für Das Aüfresen von Komplikationen in sich. Dies mag sich in einer Obstruktion als Folge der Verengung der Darmlichte oder in Blutung und Perforation als Folge zurueckgelassenen h e t e r o t o p i s c h e n Gewebes ausdruecken.

5. Wegen des haeufigen Vorkommens heterotopischen Gewebes wird die Resektion eines Ileumabschnittes u beiden Seiten des Divertikels als die Behandlung der Wahl empfohlen. Dies kann entweder mittels eines weiten elliptischen Einschnitts ueber der Basis und Connel scher Schliessung oder mittels segmentaler Resektion der das Divertikel enthaltenden Duenndarmschlinge und End-zuEnd- Anastomose ausgefuehrt werden. Die letztbeschriebene Technik eignet sich besonders fuer solche Faelle, bei denen die Basis des Divertikels so gross ist, dass jede andere Methode eine Verengerung des Darmes hervorrufen w u e r d e, was in diesem durch die Roentgendiagnose bestaetigten Falle eintrat.

RESUMEN Y CONCLUSIONES

1. El paso de sangre por el recto, especialmente en niños y en presencia se enfermedad abdominal a g u d a, hará sospechar la existencia de un divertículo de Meckel.

2. Debe examinarse rutinariamente en lo posible el ileon terminal en las operaciones abdominales.

3. En una operación abdominal en que no se encuentre un estado patológico adecuado para explicar los datos clínicos, debe aclararse la existencia de un divertículo de Meckel.

4. Debe condenarse la técnica de inversión en bolsa de tabaco después de amputación. Aunque es el más sencillo de los cuatro procedimientos señalados, ofrece también la máxima probabilidad de complicaciones. Esto puede manifestarse en obstrucción por estrechamiento de la luz o hemorragia y perforación por tejido heterotópico remanente.

5. La resección de una porción del ileon a cada lado del divertículo es el tratamiento de elección que se recomienda, en virtud de la alta incidencia de tejido heterotópico. Esto puede efectuarse con una amplia incisión elíptica próxima a la base y cierre con puntos de Connell, o con la resecsegmentaria del asa del ileon conteniendo el divertículo y anastomosis términoterminal. Esta última técnica es aplicable especialmente a los casos en que la base del divertículo es tan amplia, que cualquiera otra elección producirá una estenosis intestinal, como ele caso diagnosticado con rayos röntgen.

RIASSUNTO E CONCLUSIONI

1. L'eliminazione di sangue per via rettale, specialmente in concomitanza di una sindrome addominale acuta, dovrebbe far sospettare il diverticolo di Meckel.

2. Nelle operazioni addominali, diretta sistematica esplorazione dello ileo terminale dovrebbe essere condotta semprecché possibile.

3. Un diverticolo di Meckel dovrebbe essere sospettato e ricercato ogniqualvolta, nel corso di un intervento addominale, il reperto patologico é insufficiente a spiegare il reperto clinico.

4. La tecnica di chiusura invertente a borsa di tabacco dopo amputazione é da condannare. Per quanto sia la più semplice delle quattro tecniche delineate, purtuttavia é quella che presenta le più alte probabilità di complicazioni:—Occlusione per stenosi del lume intestinale, o emorragia e perforazione da residui di tessuto eterotopico.

5. In vista della frequenza del reperto di tessuto eterotopico, la resezione di un segmento di ileo ai due lati del diverticolo é la tecnica raccomandata. Questo procedimento può essere eseguito sia a mezzo di un'ampia incisione ellittica circonsrivente la base del diverticolo, seguita da chiusura invertente alla Connell, sia a mezzo di una resione segmentaria dell'ileo includente il

diverticolo seguita da entero anastomosi termino terminale. Quest'ultima tecnica é elettiva per quei casi di diverticolo a larga base che non permette altra tecnica se non si vuole rischiare stenosi dell'intestino come in un caso diagnosticato radiologicamente.

SUMÁRIO E CONCLUSÒES

1. A perda de sanque pelo rectum, especialmente em creanças, e na presença de doença aguda abdominal, deve levantar a suspeita de um diverticulo de Meckel.

2. O exame do iluem terminal deve, quando possivel, ser rotineiramente feito durante as operações abdominais.

3. Em uma operação abdominal em que não é encontrada uma adequada condição patológica para explicar a sintomatologia clinica, deve-se procurar atentamente um diverticulo de Meckel.

4. A tecnica de inversão em bolsa de tabaco depois da amputação deve ser condenada. Ainda que este seja o mais simples dos 4 processos propóstos, ele oferece tambem a mais alta probabilidade de complicações. Estas podem se manifestar seja núma obstrução por estreitamento do lumen ou hemorragia e perfuração devida aos tecidos heterotopicos deixados atraz.

5. A reseccão de uma parcão do ileum em cada lado do diverticulo é o tratamento recomendado, devido a alta incidencia de tecido heterotopico. Esta póde ser executada seja por uma larga incisão eliptica proxima da base com sutura de Connell ou resecção da alça de ileum que contem o diverticulo com anastomóse terminoterminal. A ultima tecnica descrita é especialmente aplicavel aqueles casos em que a base do diverticulo é tão larga que a escôlha de qualquer outro processo produza uma estenose do intestino igual á situação encontrada pelo exame radiologico.

REFERENCES

1. Lichtenstein, M. E.: Meckel's Diverticulum, Quart. Bull. Northwest. Univ. M. School 15:296-300, 1941.

2. Lavater, J. H.: De seu intestinorum compressione, Basilae, typ. J. Bertschi, 1672.

3. Ruysch, F.: Thearus Anatomicus. J. Wolters, 1707, vol. 7, fig. 8.

4. Morgagni, G. B.: The Seats and Causes of Disease Investigated by Anatomy. Trans. from the Latin by Benjamin Alexander. London: A. Miller and T. Cadell, 1769, vol. 2, p. 141.

5. Strohl, E. L., and McArthur, S. W.: Incarcerated Meckel's Diverticulum in Femoral Hernia, Arch. Surg. 38:783-787, 1939.

6. Meckel, J. F.: Handbuch der pathologischen Anatomie. Leipzig: C. H. Reclam, 1812, vol. 1, pp. 533-557.

7. Christie, A. W.: Meckel's Diverticulum, Am. J. Dis. Child. 42:544-553, 1931.

8. Gray, H.: Anatomy of the Human Body. Philadelphia: Lea and Febiger, 1924, 21st ed., p. 118.

9. Graham's Surgical Diagnosis, vol. 2, p. 628.

10. Brennemann, J.: Practice of Pediatrics. Hagerstown, Md.: W. F. Prior Company, Inc., 1944, vol. 3, pp. 23-36.

11. Wilson, H.: Meckel's Diverticulum, Am. J. Surg. 55:614-618, 1942.

12. Salzer, H.: Ueber das offene Meckel's che Divertikel, Wien. klin. Wchnschr. 17:614-617, 1904.

13. Zencker, F. A.: Virchows Arch. f. path. Anat. 21:369, 1861.

14. Hunt, V. C., and Bonesteel, H. T. S.: Meckel's Diverticulum Containing Aberrant Pancreas, Arch. Surg. 28:425-439, 1934.

15. Curd, H. H.: Histologic Study of Meckel's Diverticulum, Arch. Surg. 32:506-523, 1936.

16. Greenblatt, R. B.; Pund, E. R., and Chaney, R. H.: Meckel's diverticulum, Am. J. Surg. 31: 285-293, 1936

17. Matt, J. G., and Timpone, P. J.: Peptic Ulcer of Meckel's Diverticulum: Case Report with Review of the Literature, Am. J. Surg. 47: 612-623, 1940.

18. Dragstedt, L. R.: Ulcus Acidum of Meckel's Diverticulum, J.A.M.A. 101:20-22, 1933.

19. Waugh, J. M.: Herrell, W. D., and Crumpacker, L. K.: Peptic Ulcer in Meckel's Diverticulum Causing Intrinsic Intestinal Obstruction, Surgery 11:385-391, 1942.

20. Matthews, W. D., and Dragstedt, L. R.: Etiology of Gastric and Duodenal Ulcer: Experimental Studies, Surg., Gynec. & Obst. 55:265-286, 1932.

21. Faust, L. S.: Meckel's Diverticulum with Unusual Clinical Manifestations, M. Clin. North America 15:1483-1489, 1932.

22. Rentschler, C. B.: Persistence of Meckel's Diverticulum, Arch. Surg. 40:694-695, 1940.

23. Callander, C. L.: Surgical Anatomy, Philadelphia: W. B. Saunders Company, 1936, 3d ed.

24. Koucky, J. D., and Beck, W. C.: Perforated Leiomyoma of Meckel's Diverticulum, Surgery 10:636-641, 1941.

25. Gray, H. K., and Kernohan, J. W.: Meckel's Diverticulum—Adenocarcinoma of Gastric Mucosa, J.A.M.A. 108:1480-1483, 1937.

26. Weir, J. M.: Carcinoma of Meckel's Diverticulum, Arch. Path. 35:1159-1172, 1937.

27. Nygaard, K. K., and Walters, W.: Malignant Tumors of Meckel's Diverticulum, Arch. Surg. 35:1159-1172, 1937.

28. Harkins, H. N.: Intussusception Due to Invaginated Meckel's Diverticulum, Ann. Surg. 98:1070-1095, 1933.
29. Bowen, F. H.: Intussusception Associated with Polyp in Meckel's Diverticulum, J.M.A. Georgia 30:390-391, 1941.
30. Womack, N. A., and Seigert, R. B.: Surgical Aspects of Lesions of Meckel's Diverticulum, Ann. Surg. 108:221-236, 1938.
31. Mulsow, F. S.: Meckel's Diverticulum Containing Calculi, Am. J. Digest. Dis. 10:188-189, 1943.
32. Giles, J. F., and MacCarty, W. C.: Calcified Concretions Within a Meckel's Diverticulum, Radiology 41:491-494, 1943.
33. Halstead, A. E.: Intestinal Obstruction from Meckel's Diverticulum, Am. Surg. 35:471-494, 1902.
34. Harbin, R. M.: Meckel's Diverticulum: Methods of Resection. Surg., Gynec. & Obst. 42: 515-518, 1926.

Echoes of the Past

XI. THE FIRST LEPROSARIA

The Middle Ages witnessed many episodes of devasting disease. During those years the earliest evidence of the separation of the sick from the healthy is demonstrated. Leprosy was the first disease to receive this consideration.

In 736 A. D., St. Othmar first provided a segregation place for lepers in a "hospitiolum ad suscipiendos leprosos" near the Abbey of St. Gall. Under the direction of Pepin the Short (in 757) and Charlemagne (in 786) edicts were promulgated ordering lepers to be cared for in special buildings. The rules were very rigorous. Lepers were considered dead as far as their civil rights were concerned. They were to be supported by charitable contributions. Although mention of leper houses can be found in *History of the Franks* by Bishop Gregory of Tours (538-593), specific segregation of lepers is accredited to the efforts of St. Othmar, Pepin, and Charlemagne.

During the eleventh century leprosy began to run rampant again in Europe. With the spread of the disease, closed institutions for the lepers were constructed rapidly. These homes were known as leprosaria. In Italy, where King Rothari in the seventh century ordered the isolation of lepers, many were confined in the San Lazaro Hospital at Rome. As a result the Italian leprosaria became known as "lazaretti."

Leprosaria became prominent everywhere in the cities and villages of Europe. In France alone there were 2,000 leper houses at the beginning of the thirteenth century. The decision as to whether leprosy existed in a given person resided in a commission composed of laymen, doctors and surgeons.

Lepers were not permitted to enter churches or inns or to drink from public wells. They were even forbidden to speak to healthy people, and pointed out what they begged for by means of a stick. In their confined houses they lived on a cooperative basis. "Masters" were elected from among themselves to govern their activities.

The isolation of leprosy patients was the first step in segregation of persons with contagious diseases. Experience thus gained formed the basis for the measures taken when the "black death" spread throughout Europe in the fourteenth century. Subsequently the lessons learned in the management of lepers were applied to other conditions, eventuating at last in our modern concepts of hospitals for contagious diseases.

—Bernard J. Ficarra, M.D., F.I.C.S.

Prolapse of the Uterus

An Operation for Its Relief

AARON E. KANTER, M.D., F.A.C.S., F.I.C.S., ARTHUR H. KLAWANS, M.D., AND RUDOLF W. HACK, M.D.

CHICAGO

PROLAPSE of the uterus is that condition in which the uterus descends toward or through the vaginal introitus. This entity may take one of several forms, and there may be any degree of prolapse from the moderate to the complete descensus (procidentia) wherein the entire uterus protrudes from the vaginal orifice. In most instances cystocele and rectocele are associated with the prolapse, and in many cases of complete procidentia these accompanying conditions become so marked as to result in varying amounts of vaginal eversion with enterocele. The correction of these abnormalities by surgical intervention must accomplish, satisfactorily, many objectives, and any operation aimed at the cure of prolapse should do several things. The vagina must be restored to its normal position, depth and serviceability; the bladder should be returned to, and maintained in, its normal anatomic location as an abdominal rather than a vaginal organ; the pelvic floor and perinum should be rebuilt; the abdominal viscera should be restored and retained in their proper places. The operation herein described does all these things by a single vaginal approach, with a procedure applicable to all prolapses when the uterus is to be removed either because it is pathologic or because it is of no further importance to the patient.

Anatomic Considerations.—Three etiologic factors may contribute to the development of prolapse, and these may occur singly or in combination. Relaxation and separation of the supporting structures of the pelvis, resulting from childbirth, is the most common cause of uterine descensus. The two other potential contributing factors are (1) congenital structural weakness with disjunction of tissues and (2) the stretching that accompanies advancing years, when the mucosa becomes atrophied and its elasticity decreased and there is a loss of supporting fat and subcutaneous structures.

In order to accomplish proper repair of a prolapse and to obtain an anatomic readjustment that will fulfill all the requisites, one must keep in mind the normal anatomic character of the female pelvis, the pelvic floor and their supporting structures. Prolapse must be considered as a hernial protrusion of the pelvic floor, with the uterus acting as part of the covering of the hernial sac. This sac, which is lined by the peritoneum, has as its boundaries the pubis, the obturator internus and levator ani muscles and fascia, and the anterior wall of the rectum. The external covering of the hernia is made up of the bladder, the anterior and posterior vaginal walls and the uterus.

The uterus is retained in its normal position by three sets of supporting structures, upper, middle and lower. The upper set of supports is made up of the round ligaments, the broad ligaments and the sacro-uterine ligaments. The round ligaments have no great value as true reinforcements, but merely act as guy ropes to the fundus uteri. The broad ligaments become progressively stronger and more dense as they proceed downward on each side of the vagina, where they attach along the superior borders of the levator ani muscles and the triangular ligaments. Where the lower ends of the broad liga-

From the Departments of Obstetrics and Gynecology, the Presbyterian Hospital; the Medical College of the University of Illinois (Rush Faculty), and the Department of Gynecology, Cook County Graduate School of Medicine.

Submitted for publication May 27, 1951.

ments join the cervix and the vaginal vault, they divide, the thickest portions being reflected anteriorly to form the cardinal ligaments. These ligaments contain very strong elastic and muscle fibers that are of the utmost importance in the support of the uterus and the prevention of prolapse. Therefore, this tissue must be identified and made use of in any successful attempt at the correction of descensus. The sacro-uterine ligaments are sound structures which hold the cervix backward and upward, thus helping to retain uterus in its proper place in the pelvis and to maintain its normal anteflexion. They are peritoneum-covered bands which pass from the outer portions of the posterior surface of the upper third of the cervix outward, upward and backward to the upper part of the third sacral vertebra.

The middle supports of the uterus are the levator ani muscles and their fascia. In addition to these, the urogenital diaphragm aids greatly in the normal support of the pelvic structures. It constitutes a very strong portion of the pelvic floor and gives passive support in the region of the genital hiatus, where it reinforces the levator ani muscles. These are the chief supports of the uterus and the other pelvic viscera. So long as they remain firm these organs will be retained inside the pelvis. When they are weakened by trauma or atrophy, the pelvis is relaxed and the stage is set for all organs to herniate.

The lower support is the perineal body, a fibromuscular mass lying between the vagina and the rectum, which has bony attachments to the urogenital diaphragm. When the perineal body is stretched out or lacerated, the lower limits of the vagina evert and carry with them portions of the walls of the bladder and rectum, producing cystocele and rectocele.

In the development of prolapse there is usually an accompanying retrodisplacement of the uterus. This allows for abnormal stress to be put upon the uterus from above by intra-abdominal pressure and adds another factor in the production of this condition. As a result of this new position of the uterus (retroverted and prolapsed) with stretching of supporting ligamentous, muscular, fascial and fibrous tissues, these structures are elongated and hypertrophied. This gives an actual increase in the amount of tissue to be reckoned with in the repair and more elements that may prove of value in the final result.

Surgical Considerations.—In order to get a satisfactory permanent result from surgical treatment of prolapse, one must first decide what the operation is expected to accomplish. Many types of procedure have been advocated for the cure of this condition. Some have been discarded, and others are still in vogue with various surgeons. The choice of operative procedure should be contingent upon the proper answers to the following questions: What is the patient's age? Is menstrual function to be retained? Is the childbearing function to be maintained? Is a serviceable vagina desired or needed? Is there associated or potential pathologic change in the uterus, tubes or ovaries? Is the patient's general condition such as to preclude the performance of a major surgical procedure?

Certain operations have merit, and in the hands of their advocates give adequate results. In fact, we may resort to one of these procedures on occasion, when a patient's age, will to menstruate or desire to have children is a major consideration and hysterectomy would be undesirable; but in any such instance, we regard it as mandatory to make certain that the uterus and its adnexae are entirely normal before we agree to perform a major operation that leaves these organs in place.

The Manchester Operation and Its Modifications.—This is an operation done entirely by the vaginal route, designed to correct the prolapse and the cystocele and to retain the uterus. The operation may include tubal resection for sterilization, depending upon the desire of the patient to bear children and the confidence of the surgeon that his plastic repair will

stand up under parturition. In this procedure, amputation of the cervix is combined with plication of the cardinal ligaments on or across the lower uterine segment to support the uterus and the bladder. A bladder advancement or cystocele repair of some type is usually done, and this is followed by posterior colpoperineorrhaphy.

We object to this operation because its only value is in the correction of first-degree or second-degree prolapse; because the rate of recurrence of prolapse is relatively high; because it neglects the possibility that there may be some associated pathologic change in the uterus, and because, even though future pregnancy may be possible, it is fraught with difficulty and likely to result in postpartum prolapse.

Combined Laparotomy and Vaginal Operation.—In certain younger women, when no pathologic condition exists in the uterus and it is desirable to retain the organ, a combined abdominal and vaginal operation is done for correction of the prolapse. The vaginal portion of the operation is performed first and consists of amputation of the cervix, cystocele repair and posterior colpoperineorrhaphy. Abdominally, the round and uterosacral ligaments are shortened in order to correct the retroversion and to pull and hold the cervix back; the ovaries are suspended by shortening the utero-ovarian ligaments, and, if desired, a tubal resection is done for sterilization. This is a formidable and prolonged procedure.

Wertheim-Watkins Interposition Operation.—This was devised to place a prolapsed bladder behind the symphysis pubis, where it is maintained by bringing the uterus in front of the bladder. Added to this there must be vaginal plastic repair. With the small atrophic uterus that exists in elderly women, or when the uterus later becomes smaller, there is insufficient uterine bulk to retain the bladder, which may then roll around the uterus and again protrude. Extensive studies have shown that intractable cystitis and trigonitis develop in many patients so treated, owing to displacement of the bladder and the fact that the uterus compresses the trigone. This operation leaves *in situ* a uterus that may harbor or develop pathologic change; also it offers no assurance against future prolapse.

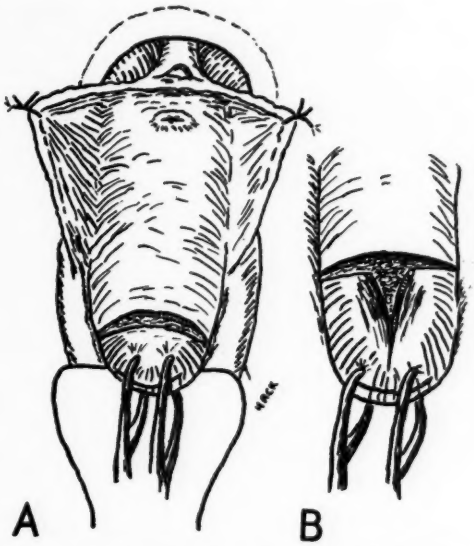


Fig. 1.—*A*, primary incision of vaginal mucosa. *B*, incision when bladder insertion is below line of primary incision.

Neugebauer-Laforte Colpocleisis.—This operation obliterates the vagina by suturing the anterior to the posterior vaginal walls below the uterus, which is pushed upward. Among the many objections to this type of operation are the facts that the vagina is closed completely, that a pathologic uterus is left in place and is hidden from all future observation and that the rate of recurrence is very high. This operation is reserved for very old women who have no further use for a vagina and who are in such sad physical condition as to preclude the performance of a more major procedure. Such persons are encountered only rarely.

Authors' Operation.—The surgical procedure devised by the senior author has been used for a number of years with

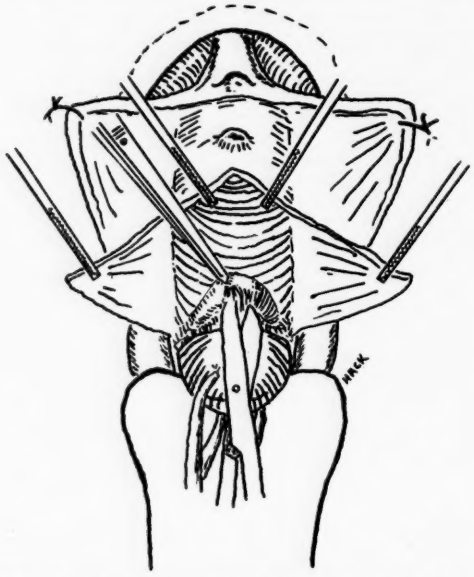


Fig. 2.—Separation of bladder and its fasciae from anterior surface of uterus. Vaginal mucosa has already been reflected off the bladder and incised up the midline.

practically complete success. It overcomes all valid objections that we have put forth against the other types of operation mentioned, and we feel that it is ideally suited to the patient with uterine prolapse when the uterus is to be removed.

In many instances proper preoperative care is as important to a happy outcome as the operation itself. Elimination of local and focal infection, edema of the tissues, traumatic and decubitus ulcerations and cystitis will assure a smoother postoperative course and a better end result. All vaginitis and cervicitis should be cleared up, together with any ulcerations that may exist, by proper medication and douching. Elimination of edema of the tissues can be accomplished by keeping the patient in bed for a few days with the prolapse reduced and retained within the vagina. This provides better tissues with which to work and eliminates a great deal of the excess vascularity that may exist. Cystitis can be eliminated by the proper use of antibiotic or chemotherapeutic agents specific for the organisms causing the difficulty. Since many of the patients are elderly, a general physical checkup and a study of the blood chemical values might aid discrimination in the choice of patients for operation and allow for preliminary treatment to fortify them before the operation is performed. Any anemia present is treated by blood transfusion before, during and after operation. Preoperative elimination of foci of infection (dental) may reduce the postoperative morbidity rate, and the preoperative administration of proper vitamin products to malnourished patients will facilitate postoperative healing.

It has been found that the insertion of a vaginal suppository containing 100,000 to 200,000 units of penicillin the night before operation resulted in a marked diminution in the rate of postoperative morbidity.[1] We use this as a routine measure.

After suitable preparation and anesthesia, the labia are sewed to the inner aspects of the thighs to provide better visibility and to keep the loose labial tissues out of the field of operation. The cervix is grasped with volsella or tenaculum forceps and is drawn down as far as possible. The reflection of the bladder at its lowermost point is found by determining the line at which the fixation of the vaginal mucosa gives way to the looseness over the bladder. Care must be taken in making the primary incision lest the bladder be entered. At this point it must be determined just what vaginal depth is desired from the completed operation. If the desired vaginal length is less than that which will be obtained by making the original transverse incision below the level of the bladder. (Fig. 1*A*), this incision is made above the lowest bladder attachment to the cervix and the lower flaps reflected downward (Fig. 1*B*) in order to reach the vesicouterine fascias for freeing. The incision is made through the mucosa in a complete circle around the cervix. The mucosa is then reflected off the bladder and uterus by combined

sharp and blunt dissection. With a round-tipped scissors the bladder is separated from the mucosa in the midline. When the proper plane of cleavage is determined it is relatively simple to insert the closed scissors under the mucosa separating this from the bladder. When the uppermost safe level has been reached, the blades of the scissors are opened and withdrawn, separating the tissues further laterally. An incision is then made up the midline of the mucosa to the farthest point of the separation. This process is continued upward until the incision reaches a point just below the urethral orifice. Forceps are placed on the flaps and the dissection is carried out laterally, the mucosa being separated from the bladder as far out as possible. Heavy fascial attachments are cut, and such tissues as will respond to the pressure of the gauze-covered finger are pushed off (Fig. 2).

The bladder is then dissected off the uterus. An incision is made at the lowermost attachment of the bladder to the uterus, and the bladder is pushed upward with a gauze sponge, sharp dissection being used for the cutting of such fibers as may be resistant to finger pressure. Thus, the bladder is reflected upward as far as it will go, and it is then held out of the way by a narrow Jackson retractor.

The uterus is then raised anteriorly and the posterior vaginal incision deepened; the peritoneum of the posterior cul de sac is identified and incised and the peritoneal cavity entered (Fig. 3*B*). This incision is widened by the fingers, and a posterior retractor is inserted. We are now prepared to proceed with the vaginal hysterectomy. The lateral incision in the mucosa is widened, and the Heaney hysterectomy clamp is placed on the exposed lower edge of the broad ligament from below upward,

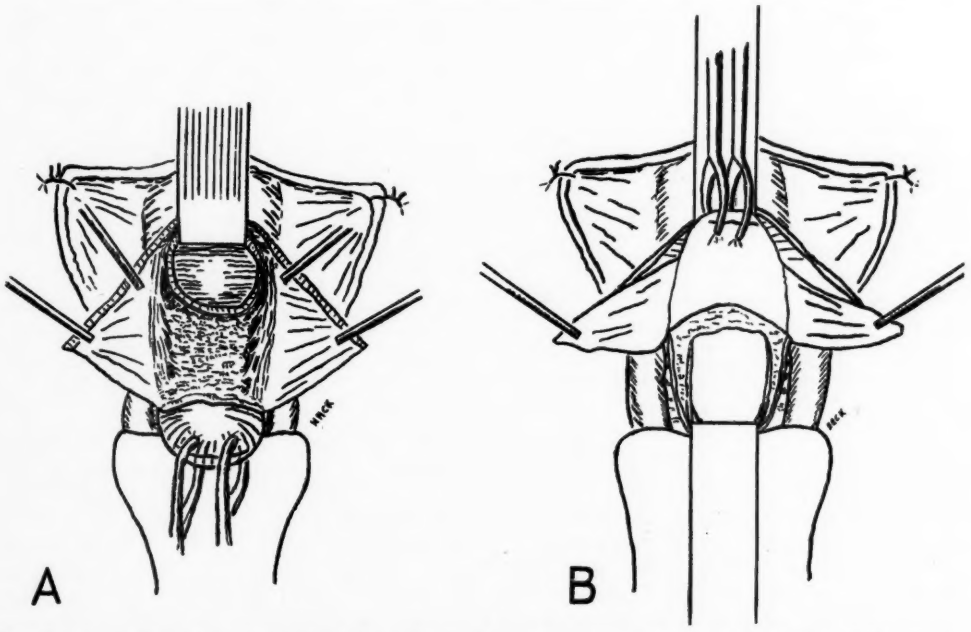


Fig. 3.—*A*, peritoneal cavity entered through anterior cul de sac and bladder held out of the operative field by retractor. *B*, peritoneal cavity entered through posterior cul de sac and posterior retractor in place.

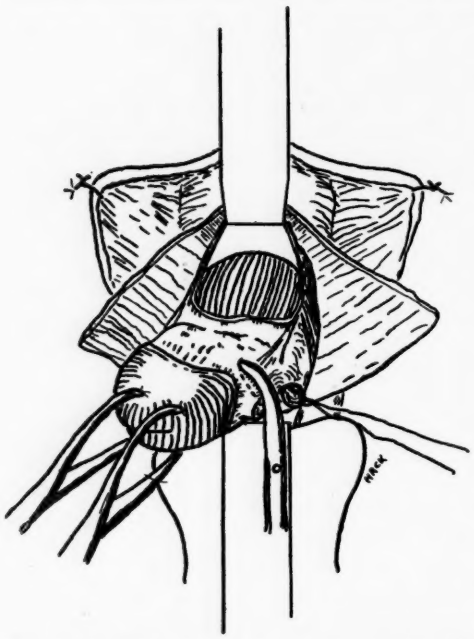


Fig. 4.—Second clamp bite on lower edge of broad ligament including uterine artery. Previously secured first bite, with long "guy rope" attached, is visible.

as close to the uterus as possible, because it is in these lower bites that a ureter may be inadvertently caught. This clamp usually catches the uterosacral ligament unless that ligament is set unusually high (Fig. 4). The tissue is severed medially to the clamp, and the material encompassed in this bite is secured by a figure-of-eight suture, which is tied as the clamp is slowly removed along its curve. This catgut is left long and the end secured by a clamp for easy accessibility and downward traction when the tissue is to be used in the later stages of the operation for closure and support. Another bite is then taken above this and sutured in the same manner. This portion of the broad ligament usually includes the uterine artery. The process is then repeated on the opposite side. At this point, the anterior peritoneal plica should be easily identifiable. The anterior peritoneum is then entered and the anterior retractor replaced inside the peritoneal cavity (Fig. 3*A*). The next bite is then taken on each side. This should bring anterior and posterior peritoneum together as an aid in peritonization. When this tissue is cut the uterus can be turned upon its axis quite readily and the fundus can be delivered. We prefer bringing the fundus out posteriorly by pulling the cervix high anteriorly and delivering the corpus by traction with tenaculums. The broad ligaments are then clamped, severed and ligated from the top downward, the first suture in this step having in it the top of the broad ligament, the round ligament and the utero-ovarian ligament. This suture is again left long, so that we can use this tissue for closure and support and so that traction on this suture will bring the tubes and ovaries into view when the uterus is removed. This process is then carried on until the uterus is completely removed. We do not keep too close to the corpus in this portion of the operation, but rather remove the redundant and lax excess of upper broad ligament, which has no strength and no supportive value.

By traction on the strings attached to the upper portions of the broad ligaments aided by traction with Allis forceps, we now can bring the tubes and ovaries into view and inspect them carefully (Fig. 5). If any pathologic condition is found, the adnexae can readily be removed by placing the clamp across the infundibulopelvic ligament and cutting away the tube and ovary. The pedicle is secured by a figure-of-eight suture.

We are now ready for plastic repair, support of the bladder and vaginal vault and closure of the peritoneal cavity and vagina. Because most of the patients already have or will have urinary incontinence and because we wish to close the herniation produced by the midline separation of the perivesical and periurethral fasciae, the first part of the repair is the bringing together of these fasciae in the

midline. This is accomplished by means of a series of interrupted fine catgut suture spaced about ¼ inch (0.6 cm.) apart, starting just below the level of the urethral opening and proceeding downward to below the bladder neck, paying particular attention to the region of the urethrovesical junction, as this is the region of the urethral sphincter. In patients with severe incontinence it may be advisable to place a second layer above this for reinforcement. The next suture is probably the most important in the entire repair, since it is designed to cure the cystocele. Starting on the left side, a suture is run from the peritoneal surface of the round ligament caught above the original suture, to the anterior peritoneum and then to the subpubic fasciae, which are among the strongest fasciae of the entire body (Fig. 6). This is tied, and the process is repeated on the right side. This makes the bladder an abdominal organ, fixes it securely above the subpubic fasciae and the round ligaments, and peritonizes the area. The next step is closure of the abdominal cavity, closure of the posterior peritoneal opening and peritonization. A suture is now placed which begins with the left round ligament, includes the peritoneal surfaces of the left broad ligament, the uterosacral ligament and the cardinal ligament, the posterior peritoneum as high up as it can be reached in order to obliterate the hernial sac of the enterocele, the right cardinal and uterosacral ligaments, the peritoneal surface of the right broad ligament and the right round ligament. Thus we have placed a purse string around the peritoneal cavity opening (Fig. 7*A*). This is pulled up and tied. In order to provide further support for the bladder and close the peritoneum more securely, the round ligaments are brought together and the long catgut identifying stays are tied in the midline. This process is repeated with the uterosacral ligaments. The only weak point that may now exist will be behind the uterosacral ligaments, the point at which enterocele

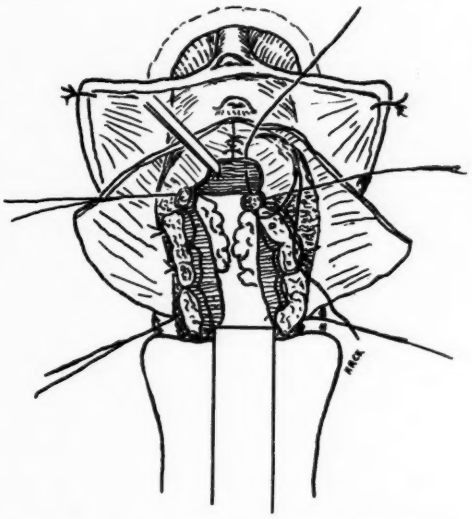


Fig. 6.—Suture encompassing upper pedicle, round ligament and subpubic fasciae.

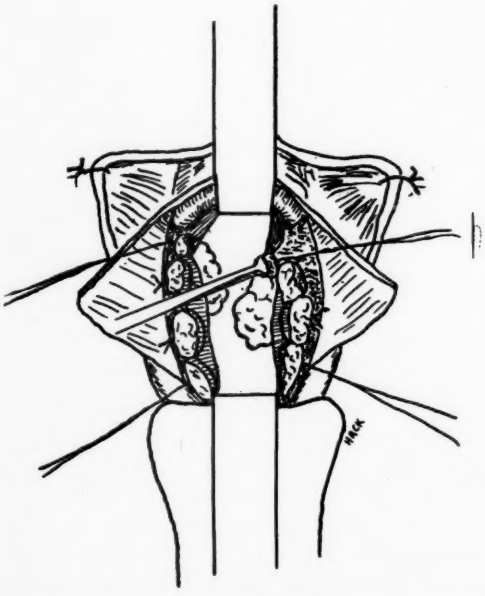


Fig. 5.—Inspection of tubes and ovaries after removal of uterus.

may originate. Exploration with a finger will determine the presence of such a vulnerable point. If it is found to exist, another suture, going from the uterosacral ligament and peritoneum to the posterior submucosal, pararectal and paravaginal fasciae to the opposite uterosacral ligament, will eliminate this hazard (Fig. 7*B*).

The vaginal mucosa is now trimmed sufficiently to allow the edges to meet in the midline. The two mucosal edges are brought together with interrupted sutures of catgut placed about ¼ inch (0.6 cm.) apart, starting at the upper limit of the vaginal incision and working downward. As we reach the level of the tied together round ligaments, the mucosal suture is run through these ligaments to obliterate the dead space and help to support the vaginal wall (Fig. 8). The same procedure is followed when the level of the uterosacral ligaments is reached. If greater maximal vaginal length is desired, the mucosa is closed in its entirety, longitudinally. If the length of the vagina is satisfactory without this added amount, the lower end of the incision (that part remaining from the circumcision of the cervix) may be closed from side to side.

For the completion of the operation it is necessary to have an extensive and satisfactory posterior colpoperineorrhaphy. This should go as high as possible, meeting the anterior incision in most cases. The great importance of perineal repair is based on three facts: first, it throws the anterior repair backward, making the lower end of the anterior incision the top of the newly formed vagina; second, it gives further support to the bladder and the peritoneal contents, and finally, it builds up the perineum, which adds length to the posterior vaginal wall and depth to the vagina. Any good method of perineorrhaphy that will accomplish these things will prove satisfactory.

The postoperative care is the same as that provided after any surgical procedure except for the treatment of the bladder. An indwelling Foley catheter is inserted at the completion of the operation and is allowed to drain continuously. This is important because (1) it prevents overdistention of the bladder and precludes the possibility of separation of sutures by the pressure of a full bladder; (2) it does away with the necessity of straining to void and the danger that such straining will result in disruption of sutures, and (3) it allows for the shrinkage and regaining of tone in a bladder which has been stretched beyond its capacity to contract efficiently. This catheter is left in place for six days. On its removal, if the patient does not void spontaneously and with relative promptness, catheterization is done on distress or every eight hours, whichever comes first. If the patient is able to void, she is catheterized once daily for residual urine until less than 60 cc. is obtained. This assures us that the efficiency of the bladder has returned, that it will not become overdistended and that the patient will be comfortable.

These basic principles are followed in all cases of prolapse in which the uterus is to be sacrificed, but we are called upon occasionally to improve or vary our technic as the case demands. At the outset of the hysterectomy we mentioned the hugging of the cervix with the clamp, but where a great deal of redundant hypertrophied tissue exists it may be necessary to remove some of this tissue in order to get sufficient tension in the supporting structures. Also, in the presence of much extra tissue it may be deemed advisable, when anchoring the bladder to subpubic fasciae, to include some of the urogenital diaphragm and the deep anterior vaginal fasciae to add to the support, because the subpubic fasciae are extremely strong and constitute the most formidable anchoring point to be found in the entire pelvis.

The operation herein described has proved eminently successful for many reasons, and we cannot see why it should not be universally adopted. The technical procedure is not difficult, is carried

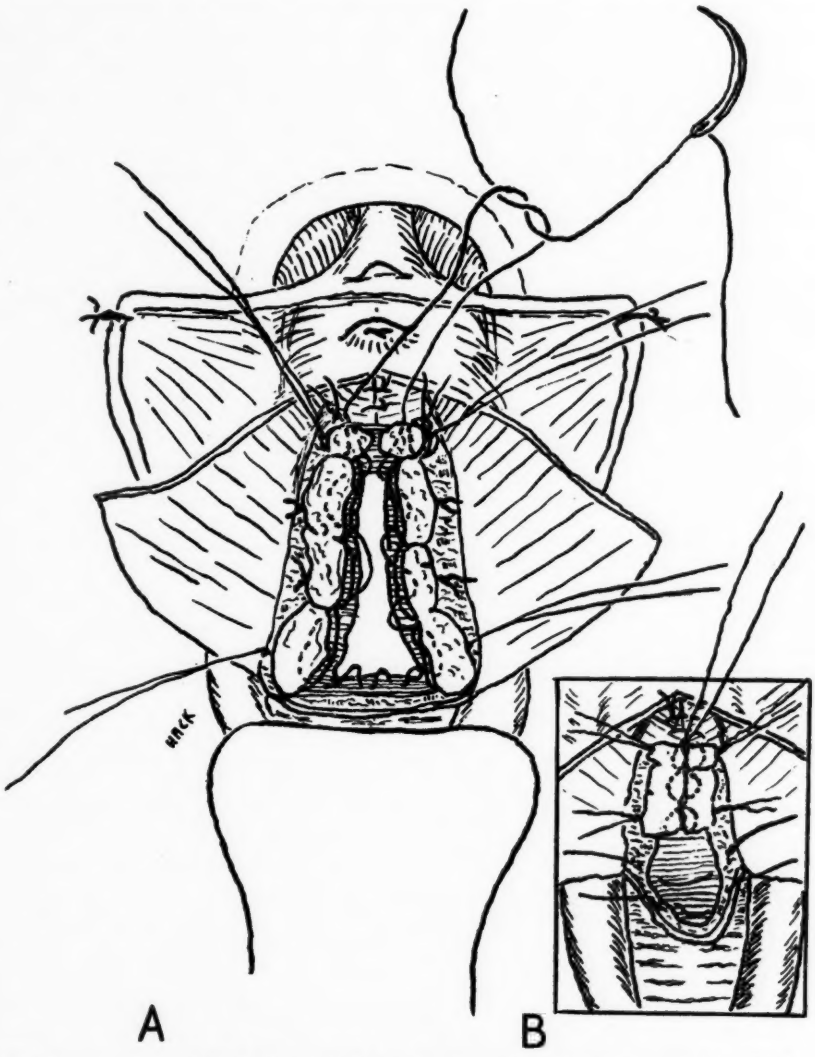


Fig. 7.—*A*, purse string suture closing posterior peritoneal cavity opening. Right and left subpubic angle sutures are shown in place and tied. *B*, suture tied. Suture placed to eradicate space between sacrouterine ligaments and perivaginal and perirectal fasciae.

out entirely under direct vision and is really safe. The advantages of vaginal hysterectomy are many, and to leave a uterus in a patient who is submitting to a major pelvic operation is not considered wise. We remove the uterus because most of the patients are approaching the menopausal age, when the uterus is no longer an asset; because many of them have menorrhagia based upon the presence of

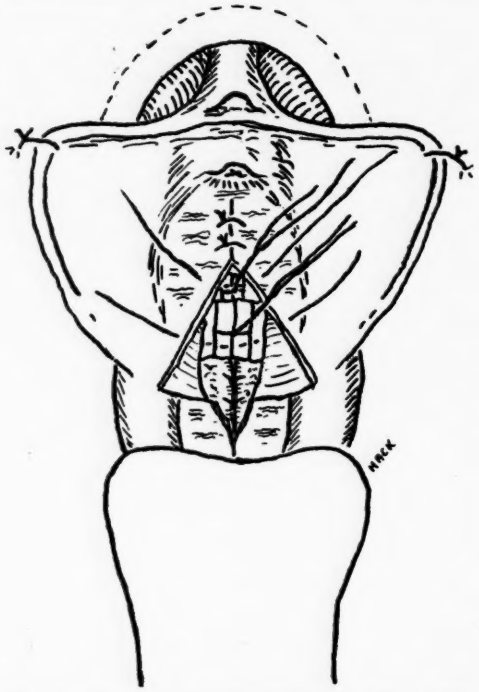


Fig. 8.—Closure of vaginal mucosa after trimming. Round ligaments have been tied together in midline, as have sacrouterine ligaments; vaginal mucosa is sutured to these as their level is reached in mucosal suturing.

fibromas, adenomyosis, endometrial hyperplasia or metritis; because it gives us an opportunity to inspect and, if necessary, remove tubes and ovaries which may be abnormal and might otherwise go on to further and more serious pathologic change, and because, with the uterus out of the way, we can accomplish a more satisfactory cure of the prolapse.

The advantages obtained by treating prolapse with this operative procedure are: raising the bladder and maintaining it at or above its original level; anchoring of the cardinal ligaments to either the subpubic fasciae, the urogenital diaphragm or the deep anterior vaginal fasciae and getting the best available support; removal of all redundant tissue; shortening of the cul de sac of Douglas to prevent enterocele; and adding further support to the bladder by bringing the cardinal, sacrouterine and round ligaments together in the midline.

RÉSUMÉ

Les auteurs décrivent une technique opératoire dans les cas de prolapsus utérin; technique qui donne, à leur avis, d'excellents résultats. La technique est décrite au complet. Les auteurs sont d'avis que cette technique est toute indiquée dans les cas où les patientes doivent subir l'hystérectomie. Ils la recommandent à leurs confrères.

ZUSAMMENFASSUNG

Die Verfasser beschreiben eine Operation zur Behandlung des Gebaermuttervorfalls, die nach ihrer Erfahrung viele Vorteile hat. Es wird eine genaue Beschreibung der Technik gegeben. Die Verfasser sind der Meinung, dass das Verfahren bei Kranken mit Gebaermuttervorfall, deren Uterus entfernt werden muss, ideal ist. Sie empfehlen das Verfahren den chirurgischen Kollegen aufs Waermste.

RESUMEN

Se describe una operación para casos de prolapso uterino, que se considera ventajosa de acuerdo con la experiencia del autor. Se consigna descripción completa de la técnica. Este procedimiento es idealmente adecuado en casos de prolapso uterino en que haya que efectuar histerectomía, según los autores. Estos lo recomiendan mucho.

RIASSUNTO

Gli Autori descrivono un'operazione per il trattamento del prolasso uterino, operazione che nella loro esperienza presenta molti vantaggi.

La tecnica operatoria dettagliata e presentata. Secondo gli Autori questo procedimento é particolarmente indicato in quei pazienti il cui utero é da rimuovere. Essi raccomandano altamente il metodo ai colleghi chirurghi.

SUMÁRIO

Os autôres descrevem uma operação paliativa em casos de prolapso do utero, o qual, em sua experiencia, apresenta muitas vantagens. Uma detalhada descrição da tecnica é includa. Na opinião do autôr este processo e ideal para o paciente com prolapso cujo utero foi removido. Eles o recomendam com insistencia aos outros cirurgiões.

REFERENCES

1. Turner, S. J.: The Effect of Penicillin Vaginal Suppositories on Morbidity in Vaginal Hysterectomy and on the Vaginal Flora, Am. J. Obst. & Gynec. 60:806 (October) 1950.
2. Webster, J. C.: Diseases of Women. Philadelphia: W. B. Saunders Co., 1907.
3. Maguire, F. A.: Anatomy of the Female Pelvis. London: Angus and Robertson, 1940.

Announcement

International Board of Occupational Surgery

The Executive Council of the United States Chapter and the Board of Trustees of the International College of Surgeons have unanimously approved the formation of an International Board of Occupational Surgery, the aims of which are (*a*) elevation of standards for the practice of occupational surgery, (*b*) conservation of the health of the worker after occupational injury, (*c*) official recognition of this specialty, (*d*) stimulation of interest in this field by students and members of the profession, and (*e*) cooperation in the establishment of facilities for graduate education in occupational surgery by means of residencies in hospitals affiliated with medical schools, or their equivalents.

Frederick W. Slobe, M.D., F.A.C.S., F.I.C.S., Chairman

E. C. Holmblad, M.D., F.A.C.S., Secretary

For further details, address Dr. Arnold S. Jackson, Secretary, United States Chapter, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10, Illinois.

Myoepithelial Hamartoma of the Stomach Wall

MAX THOREK, M.D., F.I.C.S.
CHICAGO

THE pathologist's report that the specimen removed by a subtotal gastrectomy was a "myoepithelial hamartoma" moved me to institute a search of the literature to obtain more information concerning this rarely encountered lesion.

The term *hamartoma* was coined by a great German pathologist, the renowned Hans Albrecht, in 1904. Nicholson,[1] in his recently published work on tumor formation, said that the name was given to certain adenomyomas of the gastrointestinal tract which contain tubules and cysts lined with more or less columnar epithelium, and surrounded by bundles of hypertrophied intestinal muscle, but without the interposition of the cellular structure which is characteristic of the endometrium. As these often contain more or less perfectly formed pancreatic acini, they must be regarded as instances of accessory pancreas, the ducts of which have undergone dilatation at the same time the secreting parenchyma became atrophied. The typical Albrecht's hamartoma is, then, a malformation, the cells of which exhibit some ability to grow independently. It differs from other endometrial tumors because it is unquestionably *congenital,* whereas most of the endometrial tumors encountered are *acquired* postnatally.

Aberrant or accessory pancreas has formed the subject of a considerable literature since the year 1859, when J. Klob[2] published his paper on *Pancreas-Anomalien.* The next year an Englishman, Montgomery,[3] presented two specimens to the Pathological Society of London. One of these was from the stomach wall. A number of papers which have come out in the last decade have reviewed the history *in extenso.* Especially informative are those of Faust and Mudgett[4] and of Mitchell and Angrist.[5]

It was B. Earl Clarke of Providence[6] who suggested that the "tumor-like" masses of smooth-muscle and epithelial components" occasionally encountered in the gastrointestinal tract should be studied with a view to establishing their basic identity and given a name which would recognize this common origin. The term "hamartoma" originally suggested by Albrecht is generally accepted for such tumor-like masses of embryonic origin. It is therefore suggested that this term, combined with the descriptive term "myoepithelial," be used to designate the entire group, as it seems to be "all-inclusive and indicates the pathogenesis and the component tissue elements." Clarke collected 8 cases, in 4 of which the tumor was located in the antrum of the stomach or at the pylorus.

The chief value of Faust and Mudgett's paper lies in the carefully compiled tables in which they summarized their search of the literature. They made free use of the review previously made by Poppi[7] in 1935, which listed 300 cases, going back as far as 1727. In these earlier reports considerable doubt must be cast on the correctness of the diagnosis. Faust and Mudgett added 57 cases to those listed by Poppi and in a final table noted the distribution of aberrant pancreatic tissue, including the percentage incidence. As we are concerned only with lesions of the stomach, the figures on that location alone will be cited. Of 370 lesions, 95, or 25.67 per cent, were found at the pylorus or in the stomach antrum. Thus the stomach appears as the most favored location for wandering pancreatic tissue to find a resting place. Faust and Mudgett combined all the figures of the earlier reviewers so as to get this total of 370 cases of aberrant pancreatic tissue reported up to 1940.

Submitted for publication March 29, 1951.

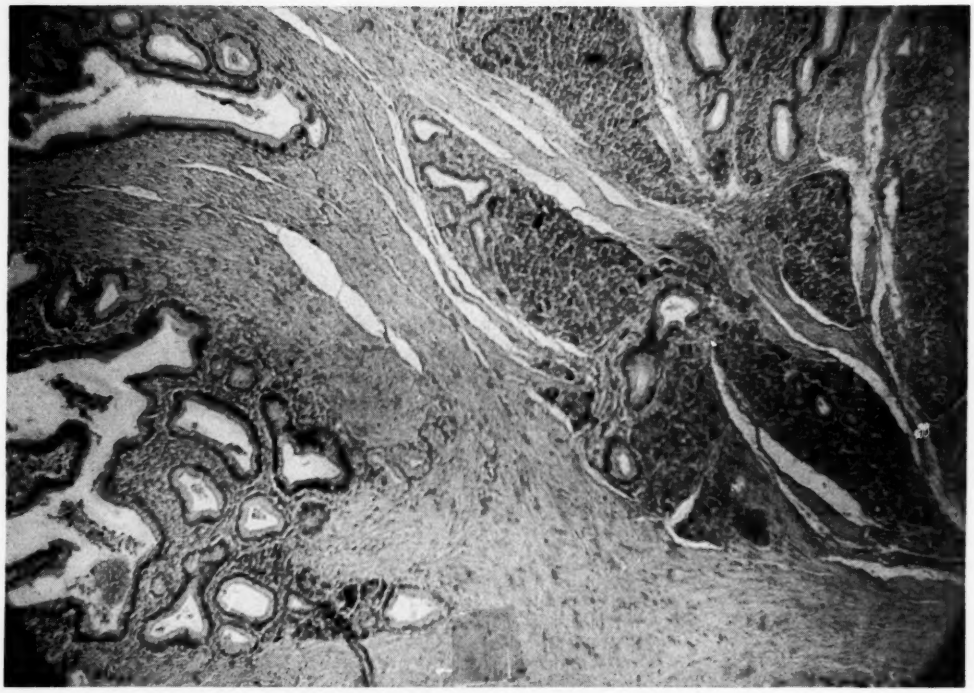


Fig. 1.—Pancreatic tissue surrounded by strands of smooth muscle fiber. At left are branching ductlike structures lined by tall cylindric cells. Hematoxylin and eosin; × 100.

Searching the literature since 1940, I have found 27 cases designated as "hamartoma", but only the report of Mitchell and Angrist[8] concerned hamartoma of the stomach. In 1941 Krieg of Detroit[9] published an account of "heterotropic pancreatic tissue producing pyloric obstruction." A review and a case report were included. Krieg's paper is largely based on that of Poppi, several of whose tables he reproduced, and he made no attempt to search the literature for cases reported during the five and a half years between Poppi's publication and his own. He did not use the designation *hamartoma* and was probably unfamiliar with Clarke's plea for instituting a standard nomenclature.

The chapter on anomalies of the pancreas in Bockus' three-volume *Gastroenterology,* which appeared in 1946, was written by D. L. Dozzi.[10] Like most textbook articles, this is merely a compilation and summary of the work of previous authors whom I have already cited. It makes no original contributions to the subject of hamartoma of the stomach. Baumel and Guibert[11] reported 5 cases of "aberrant pancreas" in 1948, but unfortunately I have not been able to see the original article, so do not know whether any of these 5 were instances of hamartoma of the stomach. The paper of von Keiser[12]—also published in 1948—is interesting in that it considers the anomaly largely from the roentgenologic viewpoint, which most other authors have ignored, or merely touched upon by saying that roentgen diagnosis is impossible. In 1947 appeared papers by Chapman and his co-workers,[13] by Hallendorf and Lovelace,[14] and by Barbosa and Waugh.[15]

Though the *origin* of "aberrant" pancreas is much disputed, one of two etiologic theories is now generally accepted: (1) that put forward by Zenker[16] in 1861 and restated by Warthin[17] in 1904; and (2) that advanced by Taylor in 1927.

1. Zenker postulated the formation of an anomalous pancreatic anlage near the primitive pancreatic diverticulum, which subsequently became separated from its primitive place of origin as the intestine lengthened during embryonic development. If such an accessory body were to form before the stomach is differentiated from the duodenum, it might become embedded in the stomach wall; if it were formed *below* the main organ, it would be carried downward. Zenker, it would seem, envisaged only one primitive diverticulum. Later observers thought of *three* anlagen, one dorsal and two ventral. The dorsal anlage develops as the head of the pancreas; the two ventral anlagen fuse to form the chief portion of the gland itself, as well as Santorini's duct. Glinski,[19] at the beginning of the present century, modified Zenker's theory by suggesting that, should there be a failure of the original diverticulum to fuse with the others, this would lead to the formation of an accessory pancreas, while separate development of each diverticulum would probably produce *two* accessory glands. The persistence of one ventral diverticulum would be likely to result in an accessory gland carried downward, but should a double dorsal outgrowth occur with the independent persistence of one, an accessory gland carried upward to the stomach would be the result.

In case of *two or more* accessory glands in the stomach wall, the occurrence of a triple—or even multiple—primitive dorsal outgrowth must be assumed. This, Warthin has pointed out, is the weak point in the Zenker-Glinski theory. In his opinion it is more reasonable to assume that accessory pancreatic tissue is formed from the lateral buddings of the rudimentary pancreatic ducts as they penetrate the intestinal wall, the mass of pancreatic tissue thus formed being snared off and carried by longitudinal growth of the intestine either upward or downward. Warthin added that this explanation is not only more simple but embryologically more satisfactory, because it is not based on the assumption of complicated embryonic conditions. Further, in this way one can explain the occurrence of isolated pancreatic tissue in the papilla of the duct of Santorini, where a number of investigators have reported finding it.

2. Taylor set forth his theory somewhat after this fashion: The ectoderm of the primitive digestive tube is destined to give rise to a great variety of epithelial structures. If a slight error in development takes place, the epithelium may appear in a situation where it does not properly belong; this is *congenital* heterotopia. Congenital heterotopia has invariably been located in the upper portion of the alimentary tract. (In a series of 81 cases, Taylor listed 6 cases of accessory pancreas found in the stomach.) Congenital heterotopia is a dysontogenetic, and not an atavistic, condition. It is a tissue formation arising from an error of development of the fetal ectoderm. In its distribution and in its antimesenteric situation, congenital heterotopia corresponds closely with the type of diverticulum occurring in the intestine of the embryo. It is concluded that the condition arises from embryonic diverticula which persist as an anomaly. The precise nature of the abnormal stimuli that results in their formation is not yet understood.

Pathologic Picture.—When the "accessory pancreas" occurs in the stomach it usually takes the form of localized nodules or flat plaques, which may be located on almost any section of the gastric mucosa, though most often in the region of the pylorus. Delhougne,[20] who wrote in 1924, collected 40 cases of this condition in the stomach; in most of them the pancreatic tissue was at or near the pylorus. Taylor, three years later, described 6 cases of

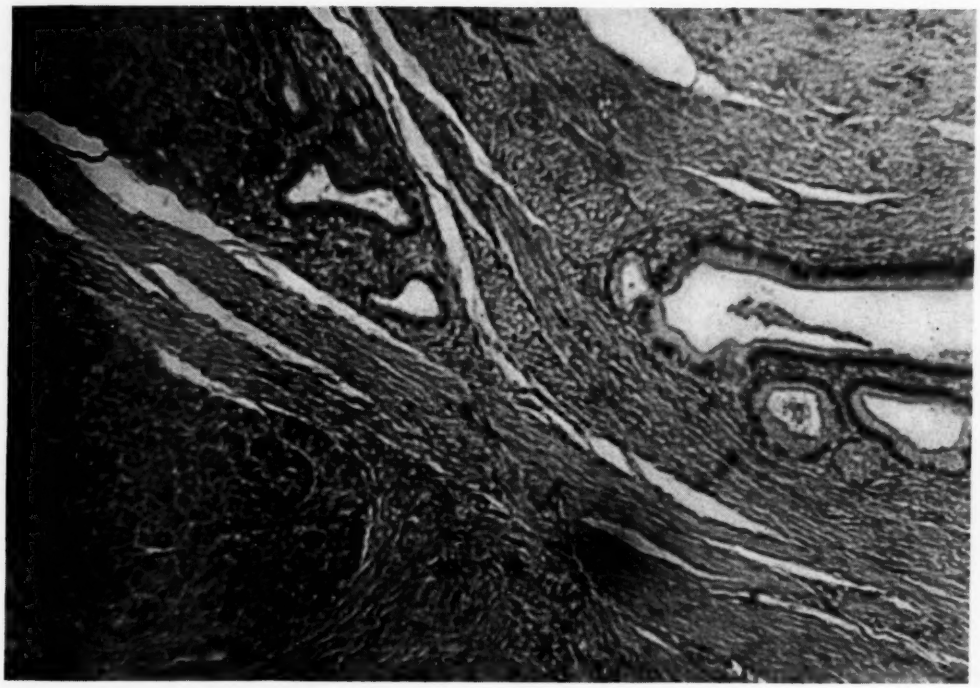


Fig. 2.—Same as Figure 1, × 200. Hematoxylin and eosin.

gastric hamartoma, 3 of the growths being within an inch of the pylorus, 2 in the fundus and 1 near the esophageal orifice. Clarke expressed the opinion that the complicated embryonic mechanisms in the pyloric region in connection with the development of the pancreas and the bile ducts probably account for the frequency with which these defects are found in this location. However, the fact that well differentiated aberrant pancreatic tissue has been observed in far removed locations, such as the small intestine, the peritoneum and the spleen, would seem to indicate that embryonic remnants from any part of the gastrointestinal tract can, if conditions are favorable, differentiate into pancreatic tissue.

Identification may be difficult, and confusion with adenomyoma has often occurred. To Faust and Mudgett the tissue frequently appeared — when roentgenologically examined—as a polypoid mass, or as an ulcer, as it may be the site of acute inflammation or even become necrotic. Other investigators have observed neoplastic growths, adenomas or carcinomas. Krieg stated (but without giving his authority) that the heterotropic mass is composed of normal pancreatic cells and has a definite duct system which appears to function in its natural manner. In approximately one third of the reported cases the mass contained islands of Langerhans. Krieg also noted that symptoms occur in only a few cases, because many accessory pancreases have been discovered only at autopsy or at operation for conditions wholly unrelated to the aberrant tissue. When symptoms are produced, however, they are frequently the result of pathologic changes of the same nature as those which might have taken place in a normally placed gland.

In reviewing the literature, one is impressed by the utter lack of any uniformity in the recording of *symptoms*. Danzis[21] listed a number of instances in which the mass of aberrant tissue was mistaken for a malignant tumor and removed by a radical surgical procedure. A number of cases are reported in which the mass has caused symptoms so closely mimicking those of acute appendicitis that a laparotomy has been hastily performed, a perfectly innocent appendix excised and, only after an extended search, the true culprit located in the stomach, so placed as to cause pyloric obstruction or some other cause of the acute symptoms. According to Krieg, heterotopic pancreatic tissue occurs more frequently than present statistics indicate, but, because it produces symptoms in very few cases, its presence is not suspected. When symptoms are present they are frequently caused by such pathologic changes as a normally placed pancreas would exhibit. Of Taylor's 6 patients, not one had a record of any manifestations of gastric disturbance during life (the cases were all observed at autopsy). Krieg gave "the fundamental cause of symptoms" as "interference with the normal intestinal motility." He went on to say that local spasm and muscle hypertrophy and contraction have been characteristic of all gastric lesions, while the complication of intussusception occurs nowhere but in the small bowel. When aberrant pancreas is located in a Meckel's diverticulum—as in a good percentage of the reported cases—its true nature as a congenital anomaly is emphasized. Poppi has given special attention to symptoms and figures and found that in nearly 40 per cent the preoperative diagnosis was peptic ulcer, located either in the stomach or in the upper part of the duodenum. Epigastric pain was the most frequent complaint, but tentative diagnoses of cholecystitis, appendicitis, pyloric obstruction or intussusception were frequently made.

Actually there would seem to be no possible way of making a preoperative diagnosis. Only when the tissue has been excised and viewed under the microscope can its true nature be ascertained. Microscopic diagnosis is easy in most cases. My own is perhaps, typical.

REPORT OF CASE

A white man aged 47 was admitted to the American Hospital of Chicago on Sept. 11, 1950. He stated that he had been well until about two years prior to admission, when he began to have pain in the epigastrium, unconnected with the ingestion of food but definitely aggravated by alcoholic beverages. At the onset of the illness roentgenograms had been taken of the gastrointestinal tract, but nothing definite had been discovered. However, a second set of roentgenograms, taken just before admission, showed a filling defect in the antral portion of the stomach. At no time had there been melena, and no loss of weight had taken place.

Physical Examination. — The patient was well nourished and well developed. He was not in distress, and except for the slight tenderness in the epigastrium, the results of physical examination were not remarkable.

Laboratory Data.—The value for blood urea nitrogen was 12.7; for blood sugar, 83. The Ewald test diselosed a total acidity level of 67, a free hydrochloric acid value of 38 a combined value for acids of 29. The value for total proteins was 6.9. The albumin-globulin ratio was 4.20/2.7. Serologic tests revealed no abnormality.

On September 14 a subtotal gastric resection was performed. The patient bore the procedure well and was returned to his bed in good condition. Convalescence was without incident, and up to the time of preparing this report there has been no recurrence of symptoms. The patient has gained weight and feels well.

The notes of our own pathologist were so unusual that we decided to submit the specimen to the American Registry of Pathology in Washington. Both reports follow:

Report of Pathologist at American Hospital, Chicago: "Specimen: Portion of stomach. *Gross Description:* Elliptic section of stomach wall (autrum), measuring 7 by 4 cm. In the center of the specimen is a firm bulging area, 12 mm. in diameter. Over this area the gastric mucosa is freely movable and no lesions are visible. Section of this bulg-

ing area shows it to be circumscribed; the cut surface is gray, varied by occasional yellowish spots. *Microscopic Description* (Figs. 1 and 2): Sections show mucosa and submucosa to be normal. In the muscular coat islands of pancreatic acini and many ductlike structures can be distinguished. The pancreatic acini are well formed. The cytoplasm of the cells contains pink-stained granules. Islets of Langerhans are not identified. The ducts vary in size from small round structures lined by a single layer of columnar cells to large tortuous ones, in which the epithelium forms papillary infoldings. Some of the ducts are filled with pink-staining acellular material. Interlacing bundles of smooth muscle fibers surround the pancreatic tissue and the ducts. *Pathologic Diagnosis:* Myoepithelial hamartoma of the stomach "(Dr. M. H. Field).

Report of Dr. Elson B. Helwig, Armed Forces Institute of Pathology, Washington, D. C.: The lesion from the stomach which you contributed . . . is interpreted as a myoepithelial hamartoma. The epithelial element in the present specimen is comprised as ductlike structures and acinar pancreatic tissue. Since there is no ballooning of the ducts, it is probable that the ducts empty into the gastric mucosa.

"Among the similar lesions recorded at the Institute, there has been an occasional one which has shown acute inflammation. On the basis of the Institute material, a malignant tumor arising in such a lesion has not been demonstrated."

COMMENT

As compared with those reported by earlier observers, this lesion would seem to take its place logically in the classification which Clarke and those who wrote after him—notably Faust and Mudgett and Mitchel and Angrist—designated as myoepithelial hamartoma. This I consider a more exact name than "aberrant pancreas". Doubtless, however, we would have been justified in calling the lesion "aberrant pancreatic tissue", in that both pathologists testified to the presence of characteristic pancreatic structure. The fact that a search of the literature indicates that hamartomas can never be positively diagnosed except by microscopic examination doubtless leaves many such lesions unrecognized. This makes it imperative that the general practitioner—usually the first to be consulted—should be kept aware of the possibility of "aberrant pancreas" as a cause of some obscure gastrointestinal manifestations which cannot be readily classified.

SUMMARY

1. Aberrant or accessory pancreas has been recognized since 1859.

2. The term *hamartoma* was coined by Hans Albrecht in 1904, to include any nodules of aberrant tissue, whether their structure was that peculiar to pancreatic tissue or not.

3. In 1940 B. Earl Clarke advocated calling all typical lesions of the gastrointestinal tract *"myoepithelial hamartoma"*. This designation is now generally accepted by medical writers. Up to 1940, 370 cases had been reported.

4. The exact cause of the lesion is not known. Two theories have been put forward—that of Zenker (1861), modified by Warthin, and that of A. L. Taylor, promulgated in 1927. Zenker postulated the formation of an anomalous pancreatic anlage near the primitive pancreatic diverticulum which became separated from its place of origin as the primitive intestine grew longer, and eventually lodged in the stomach or duodenum. Taylor assumed the occurrence of an error in development by which the epithelium of the primitive digestive tube appears in a situation where it does not properly belong; this is congenital heterotopia—an error in development of the fetal ectoderm. When the misplaced tissue is located in the stomach, it most often appears as a flat plaque or nodule at or near the pylorus. Less often, it appears in the fundus of the stomach. Identification is difficult, and roentgenologic study offers little aid. Accurate diagnosis can never be reached except by microscopic examination of tissue obtained either at operation or at autopsy.

5. A case is presented of a 47-year-old man, with pain in the epigastric region of two years' duration, not related to the ingestion of food but aggravated by alcoholic beverages. Roentgenograms taken at the onset of the illness revealed no ab-

normality, but a second roentgen examination shortly before the patient's admission to the hospital showed a filling defect in the antral portion of the stomach. Physical and laboratory examinations gave no definite information. Subtotal gastric resection permitted the removal of a mass in the antral portion of the stomach. On section this mass showed islands of pancreatic acini and many duct-like structures. The final diagnosis was myoepithelial hamartoma of the stomach.

RÉSUMÉ

Le pancréas surnuméraire a été reconnu dès 1859.

Hans Albrecht en 1904, a déjà trouvé la terminologie "hamartoma" pour tout tissu ressemblant ou non à du tissu pancréatique.

En 1940, B. Earl Clarke appelle toute lésion atypique du système gastro-intestinal "hamartoma myo-èpithélial". Le terme est actuellementaccepté. 370 cas ont été rapportés jusqu'à 1940.

L'étiologie de la maladie est inconnue. Deux théories existent. Celle de Zenker-Warthin et celle de A. L. Taylor.

L'auteur rapporte l'histoire de cas d'un homme de 47 ans souffrant depuis deux ans de douleurs épigastriques- non influencées par l'alimentation ou l'alcool. La radiologie fut négative; cependant un second cliché a montré une image lacunaire dans la portion centrale de l'estomac. Le patient subit une gastrectomie subtotale. L'examen histologique a révélé du tissu pancréatique. Diagnostic final: hamartoma myo- épithélial de l'estomac.

ZUSAMMENFASSUNG

Das Vorkommen von ueberzaehligen oder Nebenbauchspeicheldruesen ist seit dem Jahre 1859 bekannt.

Hans Albrecht bezeichnete im Jahre 1904 alle K n o e t c h e n versprengten Gewebes, ob sie die dem Pankreas eigene Struktur zeigten oder nicht, als Hamartome.

B. Earl Clarke schlug im Jahre 1940 vor, alle typischen Veraenderungen dieser Art im Magendarmkanal "myoepitheliale Hamartome" zu nennen. Diese Bezeichn u n g w i r d j e t z t von medizinischen Autoren allgemein akzeptiert. Bis zum Jahre 1940 wurden 370 Faelle berichtet.

Die genaue Ursache der Erkrankung ist unbekannt. Zwei Theorien sind aufgestellt worden, naemlich die Zenkersche [1861], die von Warthing modifiziert wurde, und die im Jahre 1927 von A. L. Taylor entwickelte. Zenker b e s t a n d darauf, dass eine anormale Bauchspeicheldruesenanlage sich in der Naehe des primitiven Pankreasdivertikels entwickelte, sich waehrend des Darmachstums von seinem urspruenglichen Sitz trennte und sich schliesslich im Magen oder Zwoelffingerdarm festsetzte. Taylor nahm an, dass auf Grund eines Entwicklungsfehlers das Epithel des primitiven Darmrohres an einen Ort auftritt, wo es eigentlich nicht hingehoert; dies ist eine angeborene Heterotopie, ein Entwicklungsfehler des foetalen Ektoderms. Befindet sich das verschleppte Gewebe im Magen, so tritt es meist als flache Scheibe oder Knoetchen am oder in der Naehe des Pylorus auf. Seltener erscheint es im Fundus des Magens. Die Veraenderung ist schwer aufzufinden, und die Roentgenuntersuchung bietet nur geringe Hilfe. Eine genaue Diagnose kann auf keine andere Weise als durch mikroskopische Untersuchung des Gewebes, das durch Operation oder Obduktion gewonnen wird, gestellt werden.

Es wird ueber den Fall eines 47 jaehrigen Mannes berichtet, der seit zwei Jahren an Schmerzen in Epigastrium litt, die in keiner Beziehung zur Nahrungsaufnahme standen, aber durch alkoholische Getraenke verschlimmert wurden. Roentgenaufnahmen, die im Beginn der Krankheit gemacht w u r d e n, ergaben einen negativen Befund. Eine zweite Untersuchung kurz vor der Aufnahme ins Krankenhaus zeigte aber einen Fuellungsdefekt im Antrum des Magens. Die Klinische und die Laboratoriumsuntersuchung

gaben keine sichere Auskunft. Eine subtotale Magenresektion ermoeglichte die Entfernung einer Geschwulst im Antrum. Die Schnitte zeigten pankreatische Acini und viele druesengangaehnliche Gebilde. Die engueltige Diagnose war "myoepitheliales Hamartom des Magens".

RESUMEN

Se han reconocido desde 1859 páncreas aberrantes o accesorios.

Han Albrecht acuñó en 1904 el término "hamartoma", para incluir cualquier nódulo de tejido aberrante con estructura peculiar o no de tejido pancreático.

B. Earl Clarke llamó en 1940 "hamartoma mioepitelial" a todas las lesiones del tracto gastrointestinal. Esta designación es ahora aceptada generalmente por los autores médicos. A partir de 1940 han sido comunicados 370 casos.

La etiología exacta de la lesión es desconocida. Dos teoría han sido emitidas, la de Zenker (1861) modificada por Warthin y la de A. L. Taylor, dada a conocer en 1927. Zenker pretendió la formación de una "inclusión" pancreática anómala cerca del divertículo pancreático primitivo, que desplazada de su lugar de origen por el crecimiento intestinal fuera alojada en el estómago o el duodeno. Taylor afirmó la ocurrencia de un desarrollo anormal, determinando la aparición de epitelio del tubo digestivo primitivo en situación que no le corresponde propiamente, heterotopia congénita por desarrollo anormal del ectodermo fetal. Cuando el tejido desplazado se localiza en el estómago, se presenta muy frecuentemente como una placa plana o nódulo en el píloro o cerca del mismo. Se presenta con menor frecuencia en el fondo del estómago. La identificación es difícil y poca ayuda ofrece la röntgenología. No puede lograrse nunca el diagnóstico exacto, excepto por el examen microscópico del tejido obtenido por operación o autopsia.

Se presenta un caso de un individuo de 47 años de edad, con antecedentes de dolor epigástrico en los últimos dos años, no relecionado con la ingestión de alimentos pero agravado por las bebidas alcohólicas. Röntgenogramas negativos al iniciarse la enfermedad, pero mostrando un defecto de llenado en la porción antral gástrica poco antes de su ingreso al hospital. El examen físico y el laboratorio no proporcionan información definida. La gastrectomía subtotal permitió la remoción de una masa situada en la porción antral gástrica. Esta masa mostró al corte acinis oancreáticos y muchas estructuras tubuliformes. Se hizo el diagnóstico final de hemartoma mioepitelial gástrico.

RIASSUNTO

Pancreas aberranti o accessori sono stati descritti sin dal 1859. Il termine *amartoma* fu coniato da Hans Albrecht nel 1904 ed includeva qualsiasi nodulo di tessuto aberrante sia che presentasse la peculiare struttura del tessuto pancreatico o no.

Nel 1940 B. Earl Clark propose di chiamare *"amartoma mio-epiteliale"* tutte le tipiche lesioni del tratto gastro-intestinale. Questo termine é oggi generalmente accettato nella letteratura medica che fino al 1940 ha riportato 370 di tali casi.

La esatta etiologia della lesione é sconosciuta. Due teorie sono state avanzate, quella di Zenker (1861), modificata da Warthin, e nel 1927 quella di A. L. Taylor. Zenker sostiene l'origine della lesione da una anomala appendice del primitivo diverticolo pancreatico, appendice che si distacca dalla sua sede di origine man mano che lintestino si sviluppa in lunghezza e per tanto viene a ritrovarsi nello stomaco o duodeno. Taylor sostiene il concetto di un errore embronale in virtù del quale l'epitelio del primitivo tubo digestivo appare in una sede cui non appartiene; questa é propriamente una eteropia congenita, un errore nello sviluppo dell'ectoderma fetale.

Quando il tessuto ectopico é situato nello stomaco, generalmente si presenta come una placca pianeggiante o come un nodulo, allogati nel piloro o nelle sue

vicinanze. Meno frequentemente si presenta nel fondo gastrico. La sua identificazione é difficile e le ricerche radiologiche offrono scarso aiuto. La diagnosi non può essere che microscopica su tessuti prelevati al tavolo operatorio o in sala autoptica.

E' presentato un caso di un uomo di 47 anni, con sofferenze epigastriche datanti due anni, sofferenze indipendenti dai pasti ma aggravate da bevande alcooliche. Gli esami radiologici eseguiti all'inizio della malattia furono negativi, ma ripetuti subito prima il suo ricovero in Ospedale, dimostrarono un difetto di riempimento dell'antro gastrico. L'esame fisico e quelli di laboratorio non particolarmente significativi. La resezione gastrica subtotale ha rimosso una massa occupante la porzione antrale dello stomaco. Le sezioni microscopiche hanno dimostrato la presenza di strutture acinose e tubulari. La diagnosi finale é stata di emartoma mio-epiteliale dello stomaco.

SUMÁRIO

O pancreas acessorio on aberrante é conhecide desde 1859. O termo hamartoma foi creado por Hans Albrecht em 1904 com o intuito de catalogir todos os nódulos de tecido aberrante, muito embora sua estructiera seja ou não peculiar as tecido pancreatico.

Em 1940 B. Earl Clark propoz a denominacão de "myo-epithelial hamartoma" para todas as lesões tipicas do sistema gastrointestinal. Essa designação é atualmente aceita pelos autôres em geral. Até 1940 foram publicados aventadas 370 casos similares. A etiologica exáta da lesão não e conhecida. Duas teorias foram aventadas—a de Lenker (1861), modificada por Warthin, e a de por warthin e a de A. L. Taylor, promulgada em 1927. Zenker afirmou que se formava um *anlage* pancreatico proximo as primitivo diverticulo pancreatico, o qual se separava de seu ponto de origem, á medida que o intestino desenvolvia, e eventualmente se implantava no estomago ou duodeno. Taylor supunha que o aparecimento de epitélio do primitivo tubo gastrointestinal em um sitio anormal deriva de um erro de desenvolvimento; isto constitúe a heterotopia congenita—um erro no desenvolvimento do ectoderma fetal. Quando o tecido erroneamente implantudo se localisa no estomago, na maioria das veges aparéce como uma placa chata ou como um nódulo, no piloro ou proscimo á ele. Menoz vezes, aparéce no fundus do estomago. A identificacão é dificil e o exame radiologico é de ponco auxilio. O diagnostico exáto é somente obtido pelo exame microscópico do tecido, obtido quer durante a operação ou durante a autopsia.

Um caso é apresentado de um paciente do sexo masculino, com 47 anos de idade, sofrendo desde 2 anos atraz de dôr na região epigastrica, não relacionada com a ingestão de alimentos, mas agravada pelas bebidas alcoolicas.

Radiografias tomadas no inicio da doença foram negativas, mas um segundo exame, feito um pauco antes do internamento no hospital demonstrou um defeito de enchimento na porcão antral do estomago. Os exames fisicos e de laboratorio não deram informação definida. A ressecção gastrica subtotal permitui a remocaco de uma massa da região antral. Córtes neisa massa mostraram acinos pancreaticos e muitas estrutriras semelhantes a ductos. O diagnostico final foi de hamartoma do estomago.

REFERENCES

1. Nicholson, G. W.de P.: Studies on Tumour Formation. London: Butterworth Co., 1950.
2. Klob, J.: Pancreas-Anomalien. Ztschr. d.K. K. Gesellshft. d. Aerzte zu Wien 15:732, 1859.
3. Montgomery, E.: Two Specimens of Accessory Pancreas, Trans. Path. Soc. London 72: 130, 1861-62.
4. Faust, B., and Mudgett, C. S.: Aberrant Pancreas, with Review of the Literature and Report of a Case, Ann. Int. Med. 14:717, 1940-41.
5. Mitchell, N. and Angrist, A.: Myoepithelial Hamartoma of the Gastrointestinal Tract, Ann. Int. Med. 19:952, 1943.
6. Clarke, B. E.: Myoepithelial Hamartoma of the Gastrointestinal Tract, Arch. Path. 33: 143, 1940.
7. Poppi, Arrigo (Balogna): Sui pancreas aberranti (Revista sintetica completa e contributo casistico). Arch. ital. d. mal. d. app.

diger. 4:534-579, 1935. (Very complete monograph).
8. Mitchell and Angrist.[5]
9. Krieg, E. G.: Heterotropic Pancreatic Lesions Producing Pyloric Obstruction: Review of Case Reports, Ann. Surg. 113:364, 1941.
10. Dozzi, D. L.: Anomalies of the Pancreas. Buckus: Gastroenterology 3:734, 1946.
11. Baumel, J. and Guibert, H.: Pancreas aberrant: étude anatomicopathologique de cinq cas., Acta chirg. belg. Supp. 2, pp. 402-406, 1948.
12. Von Keiser, D.: Das Nebenpankreas unter dem Blide benigner Magentumoren. Chirurg. 19: 154-156, 1948.
13. Chapman, B. L.; Vogel, W. F., and Schoaker, T. P.: Massive Gastric Hemorrhage Associated with Aberrant Pancreas in the Stomach, Gastroenterology, 8:367-74, 1947.
14. Hallendorf, L. C., and Lovelace, W. R. Jr.: Aberrant Gastric Mucosa and Pancreatic Tissue in Bleeding Meckel's Diverticulum, Proc. Staff Mtg. Mayo Clinic 22:53-55, 1947.
15. de Castro Barbosa, J., and Waugh, J. M.: Hetrotropic Pancreatic Tissue Clinically Significant in Gastric Wall of Boy 6 Years of Age, Proc. Staff Mtg. Mayo Clinic, 22:25-30, Jan. 22, 1947.
16. Zenker, F. A.: Nebenpankreas in der Darmwand, Virchow's Arch. f. path. Anat. 21: 369, 1861.
17. Warthin, A. S.: Two Cases of Accessory Pancreas, Physician & Surgeon 26:337, 1904.
18. Taylor, A. L.: Epithelial Heterotopias of the Alimentary Tract, J. Path. & Bacteriol. 30: 415, 1927.
19. Glinski, L. K.: Zur Kenntnis des Nebenpankreas und verwandter Zustgade. Virchow's Arch. f. path. Anat. 166:132, 1901.
20. Delhouge, F.: Ueber Pankreaskeime im Magen, Arch. f. klin. Chir. 129:116, 1924.

The United States Chapter of the International College of Surgeons

announces the creation of Junior Membership in the College. The House of Delegates, meeting on Dec. 18, 1949, established this new form of membership, with the following requirements:

One year of internship in an approved hospital

One year as resident surgeon in a specific surgical training program

For further information, address

Secretary, International Board of Surgery

1516 Lake Shore Drive Chicago 10, Ill.

The Surgical Approach to Glaucoma

DONALD T. ATKINSON, M.D., F.A.C.S., F.I.C.S., F.R.A.M. (IRELAND)
SAN ANTONIO

ALL ophthalmologists agree that during the two centuries or more in which glaucoma has been studied, little has been learned regarding the fundamental reasons for the establishment of the disease. We are led to such a conclusion by a revision of the long period of early research relative to glaucoma, as well as by the work of later investigators who have studied the disease and who all were finally convinced that the cause of the condition transcends our knowledge. Even the name "glaucoma," taken from the word "glauco" (green), is so misleading that many have suggested that the terminology associated with the condition should be abandoned altogether, along with many phases of its antiquated treatment.

In 1727, Pourfour de Petit gave origin to the theory that glaucoma was due to a derangement of the sympathetic nervous system. Reporting upon the work of several contemporaries, he contended that a division of the cervical sympathetic nerve served to reduce the tension in cases of glaucoma. That this operation failed to do this was indicated by the fact that the procedure soon fell into disuse. Regardless of this, Von Graefe, suspecting that a derangement of the cervical sympathetic nerves was at least one of the causes of glaucoma, mentioned in his archives of 1868 that experiments done upon animals tended to show that stimulating the severed ends of the cervical sympathetic nerve between the superior and the middle cervical ganglia influenced intraocular tension. After this, all investigation seemed to lie dormant until 1897, when Jonnisco reported a series of operations for the relief of glaucoma involving the removal of the sympathetic nerve lying between the upper and middle cervical ganglia.

So far as I can learn, Abadie was the first to do resections of the superior cervical ganglion for the relief of glaucoma, and his experience convinced him that he had discovered a cure for the disease. Soon, other continental surgeons were either severing the cervical sympathetic nerve or dissecting out the superior cervical sympathetic ganglion itself. No good results were reported from this procedure; the operation, therefore, again fell into disuse, and the sympathetic nervous system as a possible etiologic factor in primary glaucoma was for a time discredited. Then, as if to complete the cycle, Lagrange in 1925, Hamburger in 1930, and the now Sir Stuart Duke-Elder (1941) again directed attention to the sympathetic nervous system as being at least suggestive of the cause of primary glaucoma. At about the same time, Duane, the translator of Fuchs' book, expressed his confidence in the supposed fact that the primary cause of glaucoma was to be found in a disturbance of the sympathetic nervous system. Such an opinion by so noted an authority seemed to complete a cycle carrying us back to where we were in the early eighteenth century.

Should we be led to presume, in the final analysis, that glaucoma is primarily due to derangement of the sympathetic nervous system, surgical cure of the condition would be far from feasible. In attempting relief of glaucoma by operating along the various tracks of the sympathetic nervous system, the two areas to be most dealt with would be the upper and middle cervical ganglia and the ophthalmic or ciliary ganglion, considered by some to be responsible for glaucoma. While an accurate knowledge of the anatomy of this region makes the cervical

Submitted for publication April 9, 1951.

ganglia much more accessible than the ophthalmic ganglion, even here difficulties exist. The pneumogastric and the sympathetic nerves are often the same size in this region of the neck, and they are sometimes enclosed in the same sheath, in which case the only point of differentiation between the two would lie in the spindle-shaped superior ganglionic cells of the sympathetic nerve, which are found only by opening the sheath and following the nerve upward.

The study of the ophthalmic or ciliary ganglion becomes more academic than that of the cervical ganglia because of its absolute inaccessibility in the living subject. In the cadaver it is usually found lying between the optic nerve and the external rectus muscle, where it assumes a size no larger than that of a pinhead. Even in the cadaver, it is almost impossible to find this ganglion if there is any fat left in the orbit, and this fact indicates a greater problem with the living, in whom it may be considered entirely inaccessible.

It is, of course, impossible to predict what the future may hold in ophthalmic surgery, but a review of the past will indicate that the numerous accidents following operation upon the cervical sympathetic drove it into obsolescence, even though a large number of American ophthalmologists, among whom were DeSchwinetz, Ball, and Wilder, either practiced it personally or gave approval to it. The latter author wrote extensively on the subject and, as an admirer of Axenfeld, who practiced the operation, gave assent to it in his statement that ". . . there is obtained by the operation in simple glaucoma, a definitely important result even where other operations had been employed."

All ophthalmologists have had glaucoma patients who seemed to have been losing ground gradually regardless of the type of therapy used. In such instances one is justified in no longer temporizing with miotic therapy and should fall back upon the following proved knowledge of the anatomic points involved in the process: The fact is conclusive that anything which interferes with the normal drainage from the eye may end in primary glaucoma. It is obvious to all serious-minded ophthalmologists that a lack of balance between the secretion of the intraocular fluid and its normal escape from the eye often creates excessive intraocular tension. We may now feel quite sure that the normal intraocular fluid is largely given off from the blood vessel of the ciliary body, and we know that it escapes from the eye through various venous channels, among which are the spaces of Fontana and the canal of Schlemm. This vessel, not containing blood, always remains open in the normal state and filters out of the eye sufficient intraocular fluid to maintain a balance, but when it becomes obstructed, so that a normal outflow does not occur, a glaucoma soon results.

It is worth while to glance further at the anatomic reasons which often permit surgeons to relieve glaucoma regardless of their lack of knowledge of the actual cause. First, one may begin with the premise that the most common cause of obstruction of Schlemm's canal is pressure upon it by the base of the iris. One of the reasons for this is that as age advances the lens becomes enlarged in all diameters, which causes it to crowd the space originally allotted to it, thus blocking the iris angle. By a process of simple mechanics, the following phenomena will then be likely to occur: The anterior chamber, containing a smaller amount of fluid than does the posterior chamber, exerts only a limited degree of pressure backward; on the other hand, the fluid in the posterior chamber, by its greater volume, presses forward with such intensity that it cannot be counterbalanced by resistance of the lesser amount of fluid in the anterior chamber. Thus the lens, following the line of least resistance, is gradually carried forward, encroaching more and more upon the anterior chamber and thereby crowding the iris angle, reducing normal drainage by closing the spaces of Fontana and Schlemm's canal and ending in the gloomy picture pre-

sented by glaucoma. Coincident with this process may be an alteration of the intraocular fluid, so that it contains more cellular material than is normally present. This adds mechanically to the existing obstruction by making it more difficult for the intraocular secretions to pass through the narrowed iris angle.

Now, regardless of all their floundering in the dark, ophthalmologists are pretty well agreed that this mechanical picture is valid and can be used to great profit in the treatment of the glaucomatous patient. Nearly all ophthalmologists now believe that under conditions of this kind surgical intervention is the only possible hope for the prevention of blindness in patients to whom long-continued therapeutic measures have failed to bring relief.

Three methods of surgical attack for primary glaucoma are pretty well established. The first consists in attempts directed toward the repromotion of normal drainage by way of the canal of Schlemm and the spaces of Fontana. This has been accomplished by iridectomy more often, perhaps, than by any other procedure. The mechanical rationale of the second method has as its purpose a reestablishment of new channels of drainage by way of the suprachoroidal space. In the hands of many surgeons cyclodialysis has definitely proved that this approach is effective in a large percentage of cases. By the third method, in innumerable instances, new avenues of drainage are being opened up through extraocular routes by scleral trephining, by transfixion of the iris into corneal or scleral wounds and by iridencleisis. Aside from these three methods and their modifications there remains only surgical tampering with sympathetic nerves and their ganglia, which, as I have already stated, should be viewed with great disfavor in the light of present knowledge.

In reference to the method first mentioned, i.e., iridectomy, I have for several years limited the use of this operation to acute inflammatory glaucoma and to chronic simple glaucoma in patients threatened with cataract. In such instances I have, to the best of my ability, followed the technic originated by Von Graefe; that of making vigorous traction on the iris, so as to detach it somewhat from its base before incising it. I have every reason to believe that in cases of beginning cataract associated with primary glaucoma the broad iridectomy, accompanied by sufficient traction to pull the iris away from the ciliary body as a second step in the iridectomy, is a sound procedure, and I have found that it will usually reduce the tension. In the event that it fails to do this, which in my experience occurs only in a small percentage of cases, I have had to resort to cyclodialysis or sclerocorneal trephining, and even these, as any surgeon knows, will occasionally end in failure.

It is my opinion that cyclodialysis is the operation best suited to low grade glaucomas. The object of this procedure is to establish a passage between the anterior chamber and the suprachoroidal space, and if the operation is properly done the result is usually favorable. The most important step in this operation consists in separating the ciliary body from its attachment, thereby making a breach through the pectinate ligament. I have noticed that surgeons, when discussing cyclodialysis, almost invariably fail to give an explanation of the manner in which intraocular fluid escapes after this operation. If the method of egress of the aqueous is not understood, the procedure becomes an empiric one. Knowledge of a discovery made by Treacher Collins and Stephan Mayow makes the purpose of this operation clear. Prior to 1925 these investigators reported that india ink, when injected into the anterior chamber, escaped through the crypts at the base of the iris and thence through the vortex veins. This is an explanation, based on simple mechanics, of the manner in which the suprachoroidal space may be utilized as an avenue to carry fluid from the anterior chamber to the vortex veins.

There is very little pain associated with

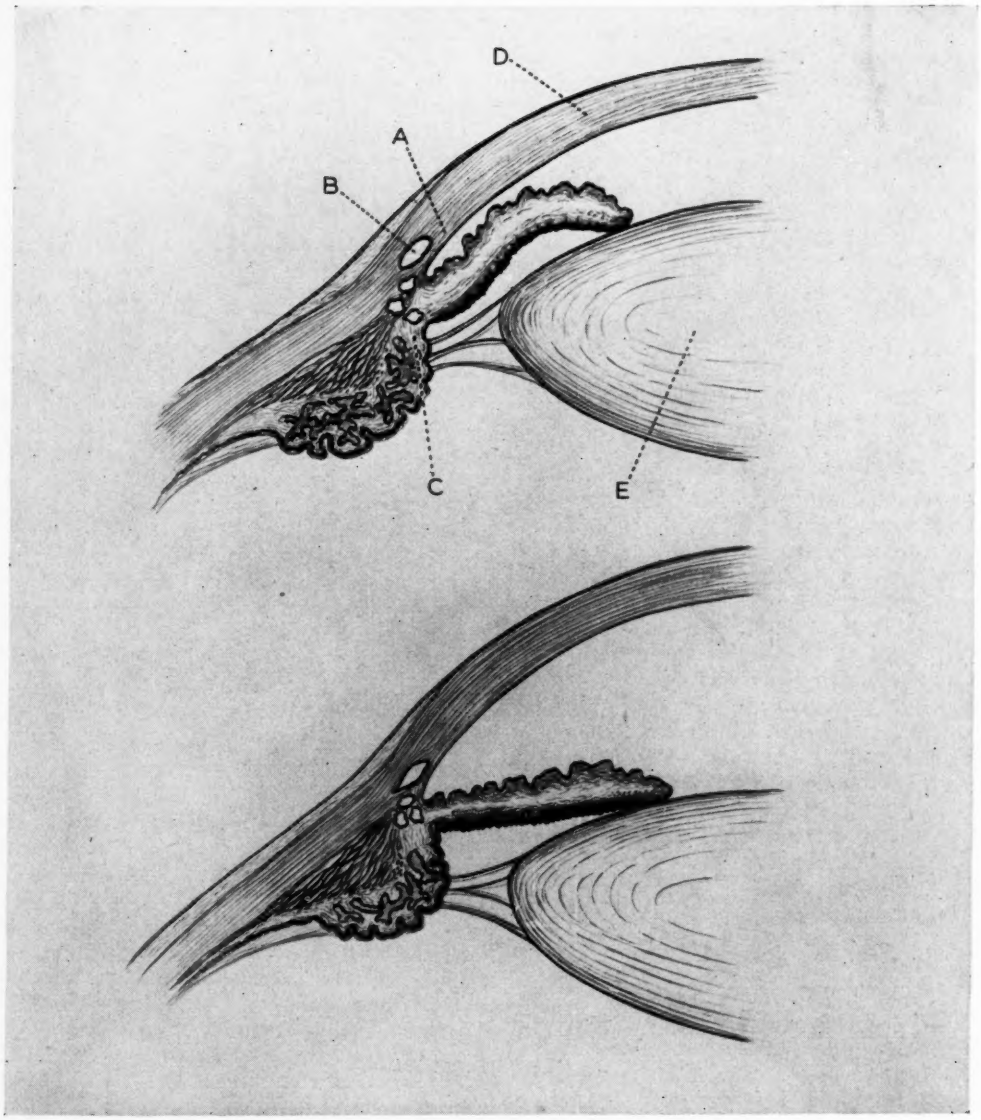


Fig. 1.—Eye with chronic simple glaucoma, showing an almost complete obliteration of the iris angle (*A*). *B*, canal of Schlemm; *C*, position of spaces of Fontana; *E*, crystalline lens; *D*, cornea. Below, cross sections of iris angle together with position of the iris in the normal subject. Schematic.

cyclodialysis, and unless the patient is unruly it should be performed with local anesthesia. The eye may be anesthetized with a 4 per cent solution of cocaine, after which a 1 per cent solution of novocaine may be injected at the site of the incision. This will prevent even the slightest pain. A speculum is then inserted, and a fine

sharp pointed knife is made to penetrate the sclera. Care should be taken during this step to see that the choroid is injured as little as possible. A small thin curved spatula is then introduced through the scleral wound and is carried slowly inward between the ciliary body and the sclera until it appears in the anterior chamber. With a to-and-fro movement of this instrument, the ciliary muscle is then gradually detached so as to open up an area for drainage. During this step great care must be taken not to injure the crystalline lens. The conjunctival flap, previously prepared, is now returned to its bed and sutured in place.

At various times I have noticed in the literature the suggestion that cyclodialysis may be done through a scleral trephine opening. After having practiced this step I am led to believe that the method is not so productive of good results as is cyclodialysis performed through an incision made with a small sharp knife. It seems probable to me that when the trephine is substituted for the incision there is more likelihood of breaking through the choroid. Such an accident would be apt to cause intraocular hemorrhage and might also interfere with choroidovenous absorption of the intraocular fluid itself. Though it has been contended by some surgeons that the suprachoroidal fistulization created by cyclodialysis is not often permanent, the operation is gaining steadily in popularity and every year is more widely regarded as an approved surgical measure for low grade glaucoma.

For patients who have simple glaucoma with slowly narrowing fields, sclerocorneal trephining has become very popular of late, though for a long period, because of postoperative complications, it had been largely abandoned. The operation consists of three steps, which must be taken with great nicety or the results will be as disappointing as they were formerly reported to be.

1. Making the flap. Care must be taken to make this of sufficient size to maintain a large subconjunctival area for absorption. With this in mind, I make my flaps from 20 to 25 mm. long and carry them back 15 or 20 mm. from the sclerocorneal margin. One must be careful not to tear the flap; otherwise, fistulization over the site of the trephine opening will prevent a good result, as such a breach will heal with adhesions which may close the trephine opening.

2. Splitting the cornea. This important step, to the inexperienced surgeon, may be a difficult procedure; it will have no terrors for one who has once successfully performed it, as he will note how easily it is accomplished if the conjunctiva is carefully elevated and the dissection is not allowed to pass too far into the cornea. A 2 mm. incision into the corneal tissue will serve its purpose well; an incision carried inward farther than this may penetrate the cornea, which would prevent the making of a proper trephine button. In such an event the corneal incision will soon close, thereby defeating the purpose of the operation.

3. This step consists in properly trephining the cornea. Here the surgeon must see to it that his trephine opening is not too large. In my hands, a 2 mm. trephine has served better than either the larger or the smaller size, and I now select this size of trephine almost exclusively. My trephines are passed through a control of my own design which keeps the blade of the trephine from slipping from side to side. The trephining instrument must be so sharp that little pressure is needed to cut a button through the cornea and the sclera. After a trephining such a button may be lost in the anterior chamber, but, although this has happened several times in my own practice, I have never seen any harm come from it. When the trephine opening has been properly made the iris immediately presents itself, having been forced outward by the aqueous humor. The protruding portion may then be grasped with a fine forceps, after which it is drawn slightly into the trephine opening and incised. Though Elliott advised against this step, it appears to me to conform to the

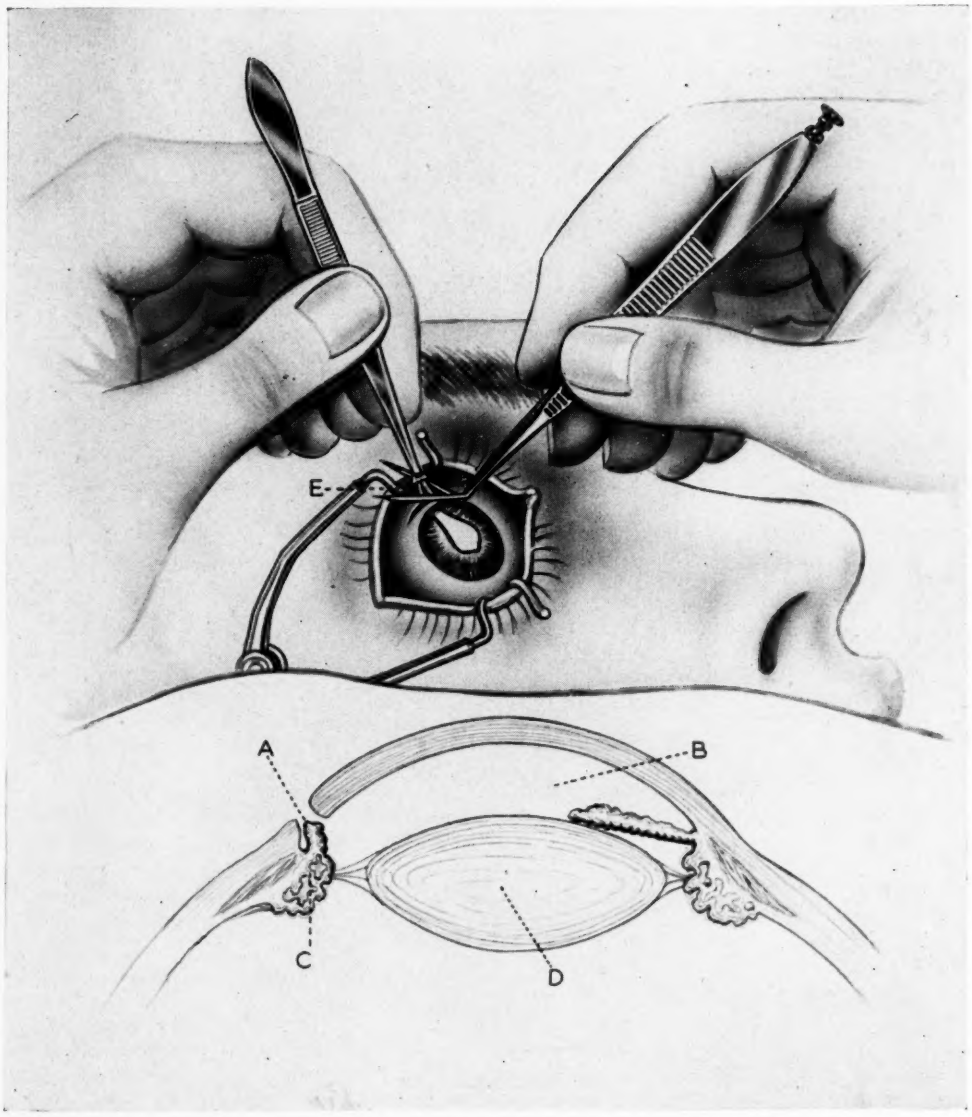


Fig. 2.—First step of iridectomy for glaucoma as performed by Von Graefe and later German surgeons. *B*, anterior chamber; *D*, crystalline lens; *C*, ciliary body. Iris drawn outward (*E*) and half amount to be removed incised. Should incision be a complete instead of partial, iris would be left much as represented by *A*.

principles of good mechanics, as it pulls the base of the iris away from the constricted iris angle. The conjunctiva should now be replaced, and two or three stitches should close the conjunctival opening. From the standpoint of mechanics, sclerocorneal trephining performed in this manner seems sound, and in several years I

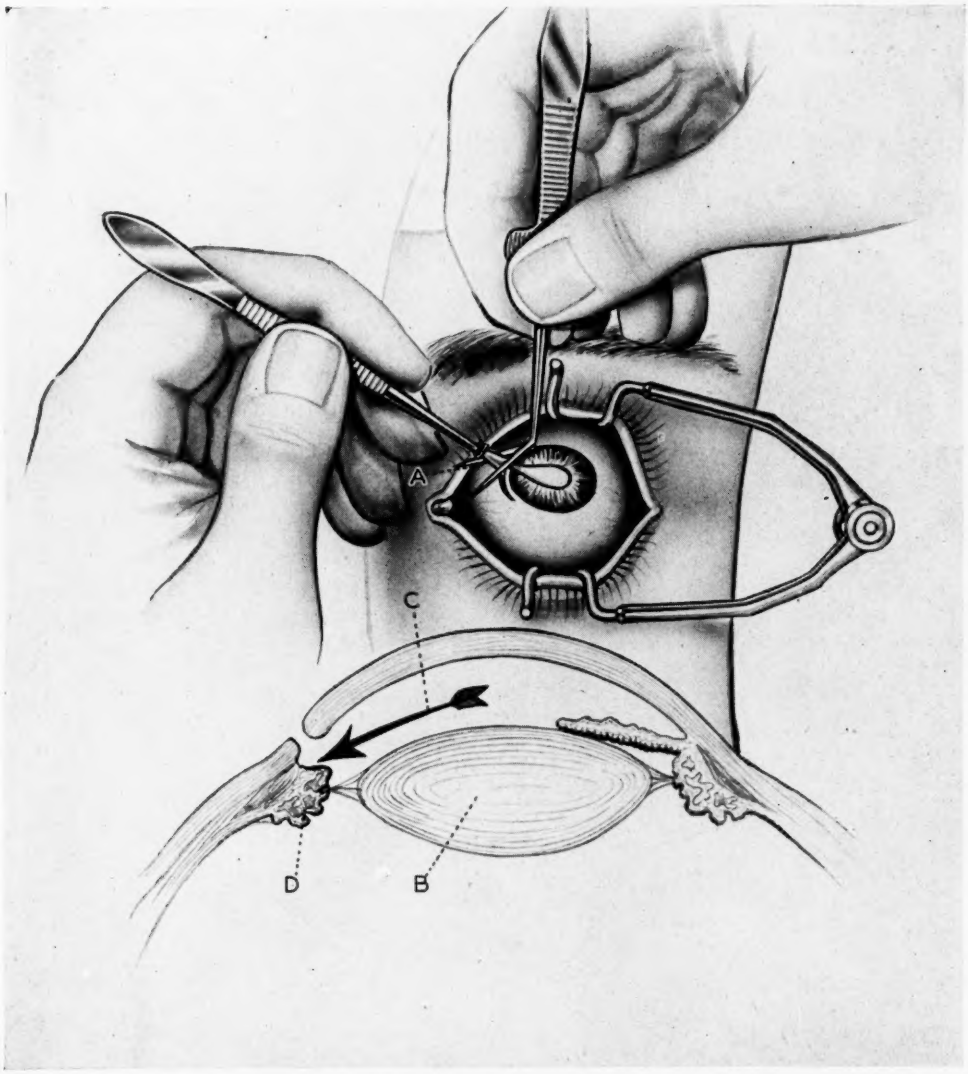


Fig. 3.—Completion of iridectomy for relief of glaucoma as done by Von Graefe and later German surgeons. *B*, crystalline lens. Half of portion of iris to be removed has been divided. Remaining iris is then drawn outward at an angle of 45 degrees where it is being incised. *A*, iris drawn to an angle of 45 degrees preparatory to its complete incision as represented by the arrow *C*.

have not encountered any of the complications which formerly carried the operation into obsolescence.

Of the iris inclusion operations, iridencleisis has steadily gained favor during the last three decades. This procedure is a somewhat modified revival of that originated sixty years ago by Critchett. A somewhat similar operation for the formation of an artificial pupil was in

use several years prior to this, a description of which may be seen in the second edition of my book *External Diseases of the Eye*. The technic as now applied to glaucoma differs from that used by the older surgeons in that the incision is made behind the sclerocorneal margin, and that the suture to keep the protruding iris

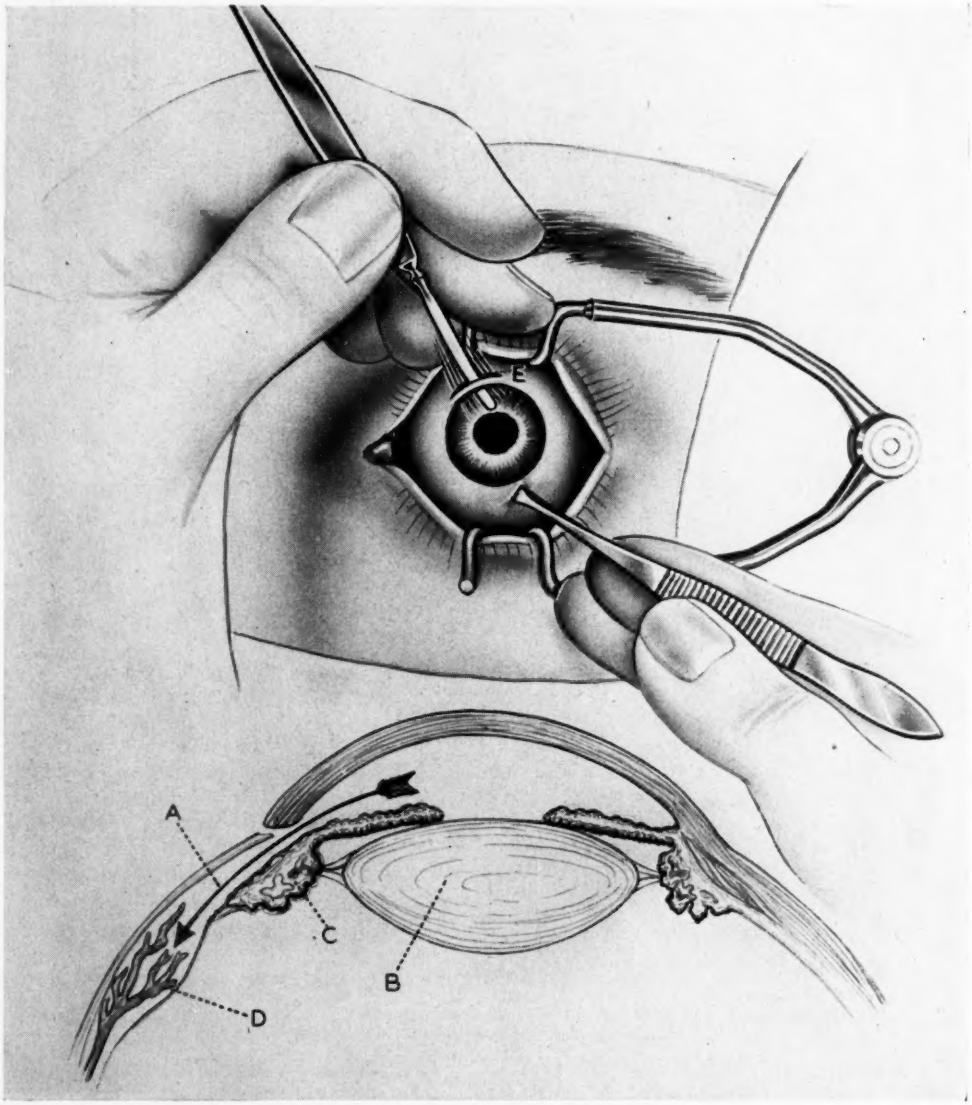


Fig. 4.—Cyclodialysis as performed on a glaucomatous eye Schematic. *B*, crystalline lens. Small flap has been prepared and small incision (*E*) made through the sclera; spatula has separated the ciliary body (*C*) through one-eighth of its circumference. Arrow *A* indicates escape route for pent-up intraocular fluid from the anterior chamber into the vortex veins (*D*).

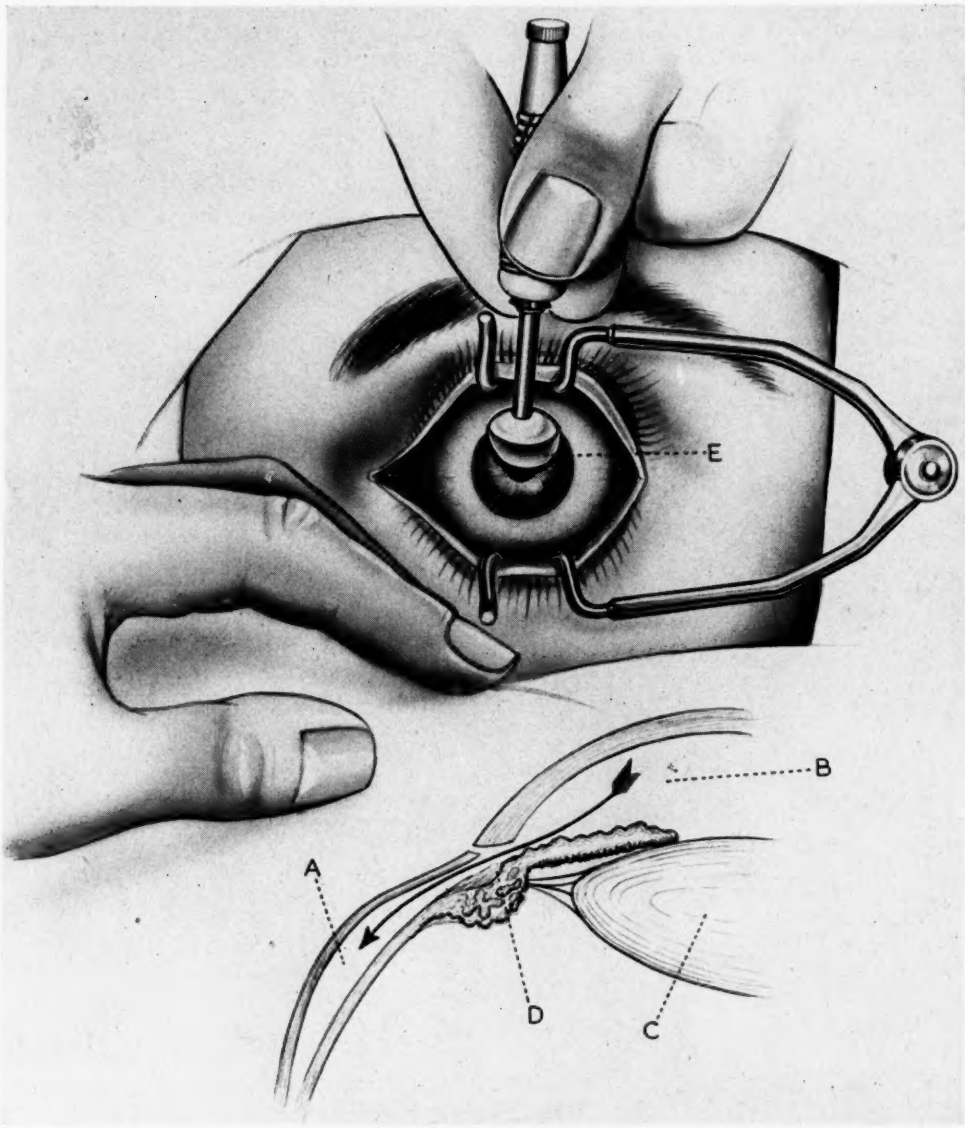


Fig. 5.—Glaucomatous eye upon which a sclerocorneal trephining is being done. *B*, anterior chamber; *C*, crystalline lens; *D*, ciliary body. Trephine being used to cut sclerocorneal button. A flap (*E*), previously prepared, has been turned down over cornea. *A*, escape route of intraocular fluid into newly formed subconjunctival space.

in place is omitted, since the normal resiliency of the sclera is now known to make this unnecessary. It might seem that purposely incarcerating an iris in a wound, when such a contingency occurring accidentally in other operations is deplored by so many surgeons, would be a false move, but in reviewing the litera-

ture I do not find any descriptions of patients with postoperative iridocyclitis and sympathetic ophthalmias occurring as complications of planned iris incarcerations.

While with the remainder of the iris inclusion operations I have had only a limited experience, it is my personal opinion that their place in ophthalmic surgery is rather well fixed and that they are comparatively free from danger, even though the theory concerning the ominous possibility of sympathetic ophthalmia as an aftermath of the incarceration of iris tissue into corneal and scleral wounds is still often mentioned.

In view of the many different angles to be considered, the surgeon has a great deal of latitude in the selection of his operation for the relief of glaucoma of any type, but candor compels one to admit that one who operates for this condition can never be entirely sure of his ground. In selecting the procedure for a given case, the type of visual field defect manifested by the patient may be considered one of the truest guides. It is my personal opinion that cyclodialysis is best adapted to simple noninflammatory glaucomas accompanied with marked concentric contraction of the visual fields. My experience also leads me to believe that when a decided Roenne nasal step is seen without proportionate contraction of the peripheral fields and when an enlarged and somewhat elongated blind spot is present, an attempt to establish new avenues for drainage through external ocular routes, preferably by sclerocorneal trephining, is the method of choice. Regardless of this, however, the diversity of opinion with regard to this suggestion puts each surgeon on his own resources, and he should feel justified in adopting the method which coincides with his individual experience and is based upon knowledge of the mechanics of the disease.

SUMMARY

Though at first little understood, glaucoma has been under observation by ophthalmologists for over two centuries. During the early period of this study the disease was generally thought to be due to a disturbance of the sympathetic nervous system. Such an opinion, after many recessions, is still occasionally brought forward by leading ophthalmologists. Thus far, nothing has been accomplished by neurosurgical procedures for relief of the condition, though for many years the sympathetic nervous system was attacked by way of the cervical sympathetic nerve trunk and the upper and middle cervical sympathetic ganglia, with unfavorable results.

Regardless of the ineffective surgery of the past, it is a well recognized fact that, although the cause of glaucoma is not known, surgeons at least are familiar with the anatomic changes found associated with the disease. These usually consist of one or more of the following changes: first, enlargement of the crystalline lens owing to its continuous growth, which normally begins in early life; second, crowding forward of the iris by this enlargement and consequent narrowing of the iris angle, and third, cutting off of the normal drainage of the eye by a crowded iris angle, with consequent encroachment upon the canal of Schlemm, the spaces of Fontana and other lesser avenues of escape from the eye of the intraocular fluids. An attack of glaucoma may then be brought about as a mechanical response to these changes by the sympathetic nervous system in patients subject to attacks of grief, worry or shock.

Should all other measures fail to overcome the condition, operation is indicated, with a view to reestablishing normal drainage of intraocular fluids. The steps to be considered for the relief of glaucoma are as follows: First, in cases of acute inflammatory glaucoma, attempts should be directed toward freeing the iris angle and relieving pressure upon the canal of Schlemm by a broad iridectomy done after the manner of Von Graefe, not in the perfunctory manner now too often practiced. Second, in cases of low grade

glaucoma with slowly narrowing fields, attempts should be made to establish new avenues of drainage by way of the suprachoroidal space. This is often accomplished by cyclodialysis. By this procedure the ciliary body is separated from its attachment and a breach is made through the pectinate ligament, thus opening an avenue for drainage between the anterior chamber and the suprachoroidal space. Third, a method often resorted to but usually only when other operations have failed consists in creating new avenues for the escape of pent-up fluids by scleral trephining or by iridencleisis. These procedures have undoubtedly brought good results in many instances, though in reviewing the literature one observes that complications attending them have been numerous.

In selecting an operation for glaucoma, the surgeon should be entirely familiar with current knowledge regarding fields, but as no two cases are alike he has great latitude in choosing his operation. Every glaucoma patient becomes a grave responsibility, and the surgeon must be conscious of this and plan his management carefully. With the tension and the fields as indices to the choice of operation and by adhering to sound surgical principles based on a thorough knowledge of the mechanics of the disease, he is on the only ground he may occupy in the treatment of this most aberrant of all surgical eye diseases.

RÉSUMÉ

Le glaucôme, ignoré au début, est connu depuis deux siècles par les ophtalmologistes. On croyait la lésion consécutive à une perturbation du sympathique. D'aucun le croient encore, aucune intervention chirurgicale sur les nerfs n'a donné de bons résultats, quel que soit le procédé employé. Si l'étiologie est inconnue, par contre la symptomatologie l'est bien. Il existe d'abord un agrandissement du cristallin; cet agrandissement repousse l'iris et donne son angle. Un iris repoussé inhibe le drainage normal de l'oeil, d'où nuisance au canal de Schlemm, les espaces de Fontana et les autres plus petits conduits. Le shock, la peine, le souci sont les causes déterminantes. Devant l'insuccès de méthodes thérapeutiques, la chirurgie est recommandée pour rétablir le drainage normal du liquide intraoculaire.

Dans le glaucôme aigu, le premier traitement consiste à dégager l'angle de l'iris et d'enlever la compression sur le canal de Schlemm par une iridectomie élargie à la façon de Von Graefe. Dans le cas plus bénin, pour faciliter le drainage, on pratique de nouveaux passages dans l'espace suprachoroidal. Ceci se fait par la cyclodialyse. Si les méthodes usuelles ne réussissent pas, on pratique l'ouverture de l'iris.

Le chirurgien qui opère un glaucôme doit connaitre son champ d'action se basant cependant sur le cas particulier pour le choix du traitement à employer. Le glaucôme est très sérieux. Le chirurgien doit peser d'avance les conséquences de choix du traitement employé.

ZUSAMMENFASSUNG

Das Glaukom ist seit ueber zwei Jahrhunderten, wenn auch im Anfang nur wenig verstanden, Gegenstand ophthalmologischer Beobachtung. In der fruehen Periode dieser Untersuchung wurde die Krankheit allgemein fuer eine Stoerung des sympathischen Neversystems gehalten. Diese Meinung wird nach vielen Unterbrechungen noch immer gelegentlich von fuehrenden Augenaerzten vertreten. Die Nervenchirurgie hat bis heute nichts erreicht, was zur Behebung der Erkrankung beitruege, obgleich durch viele Jahre hindurch das sympathische Nervensystem auf dem Wege ueber den sympathischen Halsnervenstrang o d e r ueber die oberen und mittleren sympathischen Halsganglien angegangen worden ist. Die Resultate waren unbefriedigend.

Ungeachtet des Versagens der chirurgischen Behandlung bleibt die allgemein anerkannte Tatsache bestehen, dass wir zwar nicht mit der Ursache aber doch

wenigstens mit den beim Glaukom vorliegenden anatomischen Veraenderungen vertraut sind. Diese bestehen gewoehnlich in einer oder mehreren der folgenden Veraenderungen:

1. Vergroesserung der Linse, bedingt durch ihr fortgesetztes normalerweise im fruehen Lebensalter einsetzendes Wachstum.

2. Vorwaertsverdraengung d e r I r i s und damit Verengung des Iriswinkels als Folge der Vergroesserung der Linse.

3. Absperrung der normalen Drainierung des Auges durch die verdraengte Iris und damit Beengung des Schlemmschen Kanals, der Fontanaschen Raeume und anderer kleinerer dem Abstroemen der intraokulaeren Fluessigkeit d i e n e n d e n Kanaele. Ein Glaukomanfall kann daher bei Kranken, die Kummer, Sorgen und Schock ausgesetzt sind, als mechanische Reaktion des sympathischen Nervensystems auf solche Veraenderungen zustande kommen.

Wenn alle anderen Massnahmen, eines solchen Zustandes Herr zu werden, versagen, ist ein chirurgischer Eingriff mit dem Ziel der Wiederherstellung eines normalen Abflusses der Augenfluessigkeit angezeigt. Zur Behandlung des Glaukoms sind die folgenden Schritte in Betracht zu ziehen:

1. Beim akuten entzuendlichen Glaukom sollen die therapeutischen Bemuehungen auf die Befreiung des Iriswinkels und auf die Entlastung des Schlemmschen Kanals mittels einer breiten Iridektomie und zwar nach dem von Graefeschen Verfahren (statt in der heute oft ausgeuebten oberflaechlichen Weise) gerichtet sein.

2. In leichten Glaukomfaellen mit langsam fortschreitender V e r e n g u n g der Felder sollte versucht werden, neue Abflusswege ueber den suprachoroidalen Raum zu schaffen. Dies wird haeufig mit Hilfe der Zyklodialyse erreicht. Dieses Verfahren besteht in einer Trennung des Ziliarkoerpers von seinen Befestigungen und einer Durchbrechung des Lig. pectinatum iridis, wodurch ein Abflussweg zwischen der vorderen Kammer und dem suprachoroidalen Raume geschaffen wird.

3. Eine Methode zur Schaffung neuer Abflusswege fuer die abgesperrten Fluessigkeiten, auf die haeufig-wenn auch im Allgemeinen nur nach dem Versagen a n d e r e r Operationen-zurueckgegriffen wird, besteht in der Durchstechung der Sklera oder in der Iridencleisis.

Diese Verfahren haben zweifellos in vielen Faellen gute Resultate gehabt, wenn auch bei Durchsicht der Literatur festgestellt werden kann, dass die einhergehenden Komplikationen reich an Zahl sind.

Der Chirurg, der das in einem Falle von Glaukom anzuwendende Verfahren zu bestimmen hat, muss mit den heutigen Kenntnissen bezueglich der Sehfelder voellig vertraut sein, hat aber, da ja kein Fall dem anderen gleicht, eine umfangreiche Auswahl zur Verfuegung. Jeder Glaukomkranke stellt eine schwere Verantwortlichkeit dar, deren sich der Chirurg bewusst sein muss; sein Behandlung splan muss daher sorgfaeltig abgewogen sein. Nur wenn er sich von den Befunden des Augendrucks und der Sehfelder bei der Auswahl der Operation leiten laesst, wenn er sich streng an gesunde chirurgische G r u n d s a e t z e haelt und mit dem Mechanismus der Erkrankung eng vertraut ist, nur dann steht der Chirurg auf festem Boden in der Behandlung dieser merkwuerdigsten aller chirurgischen Augenerkrankungen.

RESUMEN

El glaucoma ha sido observado por los oftalmólogos por más de dos siglos, aunque con poca compresión al principio. Se pensó primordialmente que la enfermedad era generalmente debida a un trastorno del sistema nervioso simpático. Esta opinión, después de muchos desistimientos, es aun ocasionalmente sostenida por los principales oftalmólogos como posible causa del glaucoma. Actualmente, nada ha conseguido la cirugía neurológica para alivio de la enfermedad, aunque por muchos años ha atacado el sistema nervioso simpático, actuando sobre la cadena simpática, cervical y el ganglio simpático cervical medio sin resultados favorables.

A pesar de los fracasos quirúrgicos del pasado, es bien reconocido el hecho de que, aun cuando no sabemos la causa del glaucoma, cuando menos nos hemos familiarizado con los cambios anatómicos que se encuentran en la enfermedad. Estos consisten ordinariamente en uno o más de los siguientes: (1) aumento del cristalino debido al continuo crecimiento que comienza normalmente en la edad temprana; (2) tal aumento aprieta el iris ocasionando el estrechamiento de su ángulo; (3) el ángulo apretado del iris interrumpe la canalización normal ocular, extendiéndose en consecuencia al canal de Schlemm, los espacios de Fontana y otras vías menores de escape ocular para los flúidos intraoculares. Un ataque de glaucoma puede producirse por consiguiente como respuesta mecánica a estos cambios por el sistema nervioso simpático, en pacientes sujetos a ataquea de pesadumbre, tristeza o choque.

Cuando todas las demás medidas hayan fallado en esta enfermedad, se encuentra indicada la cirugía con fines al restablecimiento de la canalización normal de los flúidos intraoculares. Deben considerarse para el alivio del glaucoma los pasos siguientes: (1) en el glaucoma los pasos torio agudo debe tratarse de liberar el ángulo del iris y aliviar la presión sobre el canal de Schlemm, mediante una amplia iridectomía hecha a la manera de Von Graefe, no a la manera perfuncional practicada frecuentemente ahora; (2) en casos de glaucoma de bajo grado con ligero estrechamiento de los campos, debe intentarse establecer nuevas vías de canalización a través del espacio supracoroideo, lográndose frecuentemente con la ciclodiálisis, procedimiento en que el cueropo ciliar es separado de su inserción y se hace una brecha a través del ligamento pestinado, abriendo en consecuencia una vía para canalización entre la cámara anterior y el espacio supracoroideo; (3) un método al que se recurre a menudo pero ordinariamente sólo cuando las otras operaciones han fracasado, consiste en crear nuevas vías para el escape de los flúidos bloqueados por trepanación escleral o por iridoclisis. Estos procedimientos han proporcionado indudablemente buenos resultados en muchas ocasiones, aun cuando al revisarse la literatura se observa que las comlicaciones inherentes a ellos han sido numerosas.

Al seleccionar una operación para glaucoma, el cirujano debe estar enteramente familiarizado con el conocimiento que atañe a los campos, pero como no hay dos casos iguales tiene amplia latitud para escoger su operación. Cada paciente de glaucoma constituye una grave responsabilidad, por lo que el cirujano debe tener conciencia de ello y meditar cuidadosamente su plan terapéutico. Con la tensión y los campos como índices para elegir una operación, y los principios quirúrgicos correctos basados en un conocimiento completo de la mecánica de la enfermedad, el cirujano se encuentra en el único campo que puede ocupar en el tratamiento de la más aberrante de todas las enfermedades quirúrgicas oculares.

RIASSUNTO

Sebbene dapprincipio poco compreso, il glaucoma é stato osservato dagli oftalmologi per oltre due secoli. Dapprima la malattia fu generalmente ritenuta secondaria a disturbi del sistema nervoso simpatico e tale opinione, dopo molte recessioni, é ancora occasionalmente avanzata da esimi oftalmologi. Fino al momento attuale a nulla hanno condotto i tentativi della neurochirurgia per quanto per molti anni il sistema nervoso simpatico sia stato attaccato via il simpatico cervicale ed i suoi gangli superiore e medio, con risultati sfavorevoli.

Indipendentemente d a l l a inefficacia della chirurgia del passato, é noto che sebbene noi non conosciamo l'eziologia del glaucoma, per lo meno siamo edotti delle modificazioni anatomiche della malattia. Tali modificazioni sono: Primo, un ingrandimento del cristallino dovuto al suo continuo sviluppo che generalmente comincia alla prima età. Secondo, un tale in-

grandimento del cristallino spinge liride in avanti restringendo in tal modo l'angolo irideo. Terzo, un ristretto angolo irideo, diminuisce il normale drenaggio dell-occhio, comprimendo il canale dello Schlemm, gli spazi del Fontana ed altre minori vie di drenaggio dei fluidi intraoculari. Un attacco di glaucoma può quindi seguire quale risposta meccanica a queste modificazioni anatomiche da parte del sistema nervoso simpatico in pazienti soggetti ad attacchi di angoscia, depressione o shock.

Nel caso tutte le altre misure fallissero, il trattamento chirurgico é indicato con l'obbiettivo di ristabilire il normale drenaggio intraoculare. I passi da fare sono: Primo, nel glaucoma infiammatorio acuto, dovrebbe tentarsi la liberazione dell'angolo irideo e alleggerire la pressione sul canale dello Schlemm con un'ampia iridectomia eseguita secondo la tecnica di Von Graefe, e non sbrigativamente come spesso oggi é praticata; Secondo, in casi di glaucoma lieve con lento restringimento dei campi, tentativi di nuove vie di drenaggio attraverso lo spazio sopracoroideo dovrebbero farsi. Questo spesso si raggiunge con una ciclodialisi. Con un tale procedimento il corpo ciliare é separato dai suoi attacchi ed una breccia é fatta attraverso il ligamento pettinato, aprendo così un passaggio fra la camera anteriore e lo spazio sopracoroideo. Terzo, un metodo al quale spesso si ricorre, ma di solito solo quando altre operazioni hanno fallito, consiste nel creare nuove vie di scarico ai fluidi attraverso una puntura della sclera o iridocleisi.

Questi procedimenti hanno indubbiamente dato buoni risultati in molte evenienze, sebbene le complicazioni citate nella letteratura siano numerose.

Nella scelta della operazione per glaucoma il chirurgo dovrebbe essere completamente familiare con le attuali conoscenze riguardanti i campi, ma poiché non due casi sono simili, egli ha una vasta latitudine di scelta della sua operazione. Ogni paziente di glaucoma é una grave responsabilità di cui il chirurgo deve essere conscio ed il suo piano di trattamento deve essere accuratamente ponderato. Avendo per indici la tensione ed i campi visivi ed aderendo ai principi chirurgici basati sulla completa conoscenza della meccanica della malattia, egli sarà sulla buona strada nel trattamento di questa che é la più atipica delle malattie chirurgiche dell'occhio.

SUMÁRIO

Ainda que á principio mal entendido, o glaucoma tem sido estudado pelos oftalmologistas por mais de dois seculos. Durante os primórdios de seu estudo, a doença era atribuida a um disturbio do sistema nervoso simpatico. Tal opinião, depois de muitos declinios, é ainda posta em voga por grandes oftalmologistas como causa suspeita do glaucoma. Ate o presente nada tem sido executado no campo da neuro-cirurgia para alivio da enfermidade, ainda que por muitos anos. O sistema nervoso simpatico tenha sido objecto de atos cirurgicos executados sobre o tronco nervôso simpatico cervical e sobre os ganglios simpaticos medio cervicais sem resultados favoraveis. Apezar da ineficácia da cirurgia no passado, é fato reconhecido que embora a causa do glaucoma, seja ignorada, suas repercussoes anatomias são familiares aos medicos. Estas usualmente consistem em uma ou mais das sequintes alterações: Primeiro, uma dilatação do cristalino devida ao seu continuo crecimento, o qual normalmente comeca na primeira idade. Segundo, tal alargamento do cristalino empúrra a iris para a frente, estreitando o angulo da iris. Terceiro, um angulo de iris amontoado impéde a drenagem normal do olho, dáhi advindo a invasão do canal de Schlemm, dos espaços de Fontana e de outras menores vias de escapamento dos fluidos intraoculares.

Uma crise de glaucoma pode se descebcadear como consequencia de uma resposta mecanica a essas mudanças dada pelo sistema nervôso simpatico em pacientes sujeitas a crises de pesar, aborrecimento ou chóque.

No hipotese de que todos as outras medidas fracassem para dominar o sindrome, a cirurgia está indicada para tentar restablecer a drenagen normal dos liquidos intraoculares. Os passos a serem considerados para aliviar o glaucoma são: primeiro, no glaucoma agudo inflamatorio, as tentativas devem ser feitas no sentido de libertar o angulo da iris e de aliviar a pressão sobre o canal de Schlemm com o suxilio de uma larga iridectomia feita com a tecnica de von Graefe e não do modo perfunctorio com que é acualmente praticada; segundo, nos casos de menor gravidade de glaucoma, de evolucão menos aguda, devem ser feitas tentivas para establecer novas vias de drenagem pela passagem do espaco supracoroidiano. Isso é muitas vezes consequido com a ciclodialise. Por meio desse processo, os corpos ciliares sao separados de seus sitios de implantacao e uma brécha e aberta atravéz do ligamento pectineo, abrindo assim uma via de drenagem entre a camara anterior e o espaco supracoroidiano. Terceiro, um mètodo util somente quando as outras operações gracassaram é o de abrir novas vias de escapamento de fluidos acumulados pela trepanação de esclerótica ou pela iridencleisis. Esses processor, indubitavelmente, produziram bons resultados em muitas circumcircunstancias, ainda que, revendo a literatura, observa-se que as complicacões em consequencia deles tem sido numerosas.

Na seleção de uma operacão para o glaucoma o cirurgião deve estar inteiramente familiarizado com os conhecimentos relativos ao campo, mas, como não ha dois casos semelhantes, eltem uma ampla latitude para a escolha de sua operação.

Cada paciento com glaucoma representa uma grave responsabilidade sobre os hombres do cirurgião que deve estar amplamente seguro da situação e dos planos com os quais a condição patologica deva ser cuidadosamenta combatida. Com a tensão e os campos como indice de escôlha de uma operacão e com a observancia de principios basicos, de conhecimento completo da enfermidade e de sua mecanica, o cirurgião esta no unico terreno que ele póde pisar no tratamento da mais aberrante de todas as doenças dos olhos.

BIBLIOGRAPHY

Apin, Carl: On the Principles and Methods of Clinical Tests of the Tonometer, Klin. Monatsbl. f. Augenh. 88, January 1932.

Atkinson, D. T.: External Diseases of the Eye. Philadelphia: Lea & Febiger, 1937, 2d ed.

Beard, C. H.: Ophthalmic Surgery. Philadelphia: P. Blakiston, 1914

Brookes, G.: Elliot's Trephine Operation; A Variant, Brit. J. Ophthalmol. 15, January 1931.

Duke-Elder, W. S.: Some Physicochemical Factors Influencing the Intraocular Pressure: Experiments on the "Profused" Eye, Brit. J. Ophth., vol. 13, August 1929.

Fortin, E. P.: The Canal of Schlemm and the Pectinate Ligament, Arch. de oftal. de Buenos Aires, 4, July 1929.

Frick, G.: Diseases of the Eye. John Anderson, London: John Anderson, Graefe, A.: Iridectomy and Glaucoma: A Study of the Glaucomatous Process, Arch. Ophthalmol. 1, January 1929.

Grosz, Emil: The Operative Treatment of Glaucoma, Arch. Ophth., 5, March 1931.

Guiral, A., and Viondi, R.: Surgical Treatment of Glaucoma According to Its Different Types, Arch. de oftal. hispano—am., 30, September 1929.

Haden, H. C.: Some Observations in Regard to Glaucoma Simplex, Arch. Ophthalmol. 4, September 1930.

Hamburger, Carl: Fundamentals of the Doctrine of Glaucoma, Klin. Monatsbl. f. Augenh. 87, November 1931.

Passow, A.: The Relations of the Entire Organism to Primary Glaucoma, Arch. f. Augenh. 103, June 1930.

Peter, L. C.: The Comparitive of Glaucoma Operations, Trans. Pacific Coast Oto—Ophth. Soc. April 1928.

Ridley, F.: The Intraocular Pressure and Drainage of Aqueous Humor, Brit. J. Ophthalmol. 15, February 1931.

Somojloff, A. J.: The Action of Pilocarpine on Intraocular Pressure, Klin. Monatsbl. f. Augenh. 82, April 1929.

Scarpa, A.: Principles of Diseases of the Eyes. Briggs Translation, London: T. Cadell, 1806.

Sloan, L. L.: The Paracentral Field in Early Glaucoma, Arch. Ophth. 5, April 1931.

Sorsby, Arnold: Acute Glaucoma: A Historical Note, Brit. J. Ophthalmol. 16, September 1932.

Werner, Sigurd: A Study of Hereditary Juvenile Glaucoma, Acta ophthalmol. 7, 1929.

Whithers, T.: Observations on the Abuse of Medicine. London: J. Johnson, 1775, p. 28.

Word, C. A.: A System of Ophthalmic Operations. Cleveland: The Cleveland Press, 1911, vol. 2.

Preoperative and Postoperative Care in Gastric Surgery

S. H. BABINGTON, M.D., F.I.C.S.*
BERKELEY, CALIFORNIA

SURGERY has gone through several stages during the last fifty years. Until recently the emphasis was placed on mechanical knowledge, speed, and dexterity, and the surgeon had to be well versed only in anatomy and pathology. However, during the last two decades, physiology, physiochemistry and the laboratory have taken a more and more prominent place in the field of surgery. Because of these newer developments, the details of preoperative and postoperative care in gastric surgery have become more important than ever. They require a knowledge and understanding of physiochemical disturbances in the body brought on by gastrointestinal disease, anesthetics and trauma concomitant to surgery and surgical manipulations. Since these changes vary with each case, it is neither practical nor desirable to tabulate routine orders for their preoperative and postoperative care. As a matter of fact, to set up a routine not only would lead to many unnecessary procedures but might become a dangerous weapon in the hands of the less experienced. One should learn the basic principles whereby one can determine the exact needs of each patient and accordingly prescribe preoperative and postoperative measures for each case.

Physiochemical Tests Versus History and Physical Examinations.—Since our physiochemical knowledge in some of its aspects is still in flux and since a great deal more experimental work must be done before the true meaning of some physiochemical disturbances is understood, too many surgeons either ignore chemical tests entirely or place so much emphasis on them that the patient is forgotten in the maze of elaborate tests.

One need not go to either extreme. On the basis of a careful history and a painstaking physical examination, one should be able to tell what physiochemical changes have taken place, and to what extent, in the early conditions requiring gastric surgical procedures. As a matter of fact, whether the disease is early or advanced, the patient's general condition and history provide a much better index of his needs than are some of the complex laboratory data. The age, weight, strength and color of the patient, the turgor and quality of the skin, dryness of the mouth and tongue, the color and quality of the mucous membranes, the character of the eyes, the appetite, the history of thirst or loss of it, nausea or vomiting, the presence or absence of edema, the quality and number of stools, the amount and specific gravity of the urine, mental attitude, nervousness, lassitude and paresthesias, give a wealth of information concerning the physiochemical disturbances. From these one should be able to estimate whether there is need for fluids, electrolytes, amino acids and transfusion, and the amounts needed.

True, laboratory tests will be indicated in many cases, especially for patients who are poor risks; but these tests should be evaluated in the light of the patient's history and general condition, as they are at times misleading when taken alone. For example, hypoproteinemia may be more marked than the plasma protein determination indicates, or the patient may be more anemic than one may be led to believe from a high hemoglobin and red blood cell count—all of which may be

*Chief of Surgery, Herrick Memorial Hospital.
*Read at the Fifteenth Annual Assembly of the United States Chapter; International College of Surgeons, Cleveland, Oct. 30, 1950.
Submitted for publication Oct. 31, 1950.

caused by marked dehydration. Therefore, determination of blood proteins and chlorides without correction in the total blood volume are of little value. Plasma protein percentage should be corrected to the ideal hematocrit reading of 45 per cent.[3]

Increase in carbon dioxide combining power may be due to pulmonary emphysema interfering with carbon dioxide elimination instead of alkalosis. On the other hand, the carbon dioxide content of the blood may be low even in the presence of alkalosis, if there has been hyperventilation. Underventilation often is responsible for the reverse condition—acidosis—in the presence of asthma or excessive use of opiates. Blood chloride may be low, but not necessarily because of lack of chlorides, as seriously ill patients frequently maintain a lower level without having lost undue amounts of chlorides, perhaps owing to adrenal insufficiency. It has been suggested that plasma chloride determinations be entirely abandoned because of their unreliability,[2] and that plasma sodium determinations be made instead. In severe dehydration, kidneys are called upon to retain sodium, and therefore the urinary output of sodium also may be misleading. From these few examples alone it becomes evident that preoperative and postoperative administration of fluids, electrolytes and proteins based on chemical tests alone may be very disastrous for the patient instead of beneficial.

Reversible and Irreversible Physiochemical States.—First consideration should be given to the reversible physiochemical states, so that they may be corrected preoperatively and properly maintained during and after operation. These are: dehydration, hypochloremia, secondary anemia, diminished blood volume, infections, vitamin deficiencies, and functional disorders of the heart, liver and kidneys. If not brought under proper control promptly, any of these reversible states can become irreversible.

Irreversible states such as old age, chronic cardiac disease and kidney or lung disease, arteriosclerosis, hypertension and diabetes should be noted and evaluated from the beginning in order to forestall any physical or chemical failures that may occur because of them. Though none of these physiochemical disturbances or pathologic states is likely to occur singly, they are discussed separately for the sake of clarity.

PREOPERATIVE CARE

Reversible Physiochemical States.—1. *Dehydration:* Dehydration is an accompaniment of poor nutrition and loss of weight. In a case of simple water loss the patient is thirsty and his mouth dry. Replacement of water takes care of the situation, and the patient does not need saline therapy. However, in "poor risks" for gastric surgical intervention, the loss of fluid is greater because of anorexia or vomiting. These patients are not able to replenish the obligatory fluid loss which occurs through the kidneys, skin and lungs. Having lost an amount of fluid equal to 6 per cent of body weight, or 4,200 cc. in a man weighing 70 Kg., the patient suffers from very severe symptoms of dehydration,[3, 6] mania (or apathy, if there is also electrolyte loss), disorientation, weakness, low blood pressure, and eventually coma; with a loss of 20 per cent, death ensues, as demonstrated experimentally by Rubner.[3]

The body fluid needs can be easily estimated by the urinary output; 1,000 cc. of urine with a specific gravity of 1.015 to 1.020 is considered a satisfactory output for seriously ill patients. However, attention must be given to its specific gravity, as more water is needed when the specific gravity diminishes. In making a quantitative determination of fluid loss, one should remember that obligatory loss is at least 1,500 cc. in twenty-four hours. To this should be added estimated losses that occur because of excessive perspiration, fever or vomiting. Darrow estimated that about one-third of extracellular electrolyte is lost in marked dehydration, and recommended physiologic

solution of sodium chloride equivalent to one-twelfth to one-fifteenth of body weight—or 70 cc. of the solution per kilogram of body weight—to restore the electrolyte balance to a normal level. In a man weighing 70 Kg. this would be equal to 4900 cc. of saline solution. Addition of sodium chloride is necessary, as without sodium water will not stay in the tissues. However, overhydration should be avoided, as this will overload the extracellular compartment and be followed by edema and malfunction of the organs.

Hemoglobin becomes concentrated with dehydration. However, Wangensteen considers the weighing scales 25 to 50 times as dependable as the changes in the hemoglobin level for determining the state of hydration. In his opinion, weighing the patient will assist in detecting overhydration, which may be insidious and very damaging. Fluctuations of 3 per cent of the preoperative normal value require careful scrutiny and attention.

2. *Electrolyte Balance:* In a poor risk patient with a large loss of fluids, correction of the electrolyte balance that becomes the most pressing problem. The symptoms are dehydration and electrolyte loss combined; thirst, however, is absent. Weakness and apathy increase when continuous gastric suction is maintained without any effort to make up the loss parenterally, and it ends in shock. The hematocrit value and the plasma and nonprotein nitrogen concentrations also increase in the blood. Most of the electrolyte loss being in the form of *chloride from the stomach,* there is a drop in blood chlorides. The Carbon dioxide combining power of the blood increases; and alkalosis, with its symptoms of shallow respiration, carpopedal spasm and positive Chvostek's sign follows. To avoid this catastrophe, gastric secretions lost by suction should be measured and replaced volume by volume with physiologic solution of sodium chloride. Though more chlorides than sodium are lost through suction, normally functioning kidneys are able to take care of the extra sodium given in the solution.

To raise the plasma chlorides by 100 mg. per hundred cubic centimeters, 0.5 Gm. of sodium chloride per kilogram of body weight may be needed.[3] As soon as a normal blood chloride level has been established, kidneys begin to excrete 5 to 10 Gm. of salt which had been suppressed up to that time. The amount of sodium chloride needed is variable, depending on fever, amount of perspiration and quality of renal and cardiac function. If alkalosis is not promptly corrected, renal insufficiency develops, since kidneys do not long tolerate excretion of urine with a high *p*H. On the other hand, excessive use of saline solution may lead to edema of the interstitial tissues, resulting in pulmonary and other complications.

Hypochloremia should be suspected in patients with prolonged vomiting and those subjected to gastric suction. Excessive perspiration on the operating table in sultry weather may also produce hypochloremia. An abnormal reduction in electrolytes continued for several days should arouse suspicion of a low blood chloride level. If there is doubt, determination of the blood chloride level should be done. If it is 300 mg. hundred cubic centimeters or less, immediate treatment should be given. If it is around 150 mg., an acute shocklike state must exist, with prodromal symptoms: vomiting of small amounts of bile, abdominal distention, mild abdominal cramps, hiccoughs, gas retention, extreme weakness and oliguria. A daily maintenance dose of 30 to 40 Gm. of salt may be needed in such a case.[4] When the plasma chlorides are low and large quantities of dextrose are given, rapid diuresis takes place, leading to further dehydration.

The replacement of lost gastric fluid[5] should be 33 per cent of the total in the form of dextrose-water and 67 per cent in the form of dextrose-saline. When the salt solution contains also dextrose, it should have only 5 to 6 Gm. of salt per liter (instead of 9 Gm.) for its isotonicity.[6]

In cases of severe alkalosis which may result from continuous gastric suction, 2 per cent ammonium chloride in physiologic solution of sodium chloride may be used to lower the serum carbon dioxide level at the rate of about 1 volume per cent for each gram administered to an average adult.[7] In patients who have acute infections it becomes more difficult to maintain an even electrolyte balance as the sepsis retention of sodium chloride takes place.

Because of the loss of *calcium and potassium,* Ringer's solution, which contains calcium and potassium, may be indicated in place of physiologic saline. Marked restlessness and muscular weakness or twitching should make one suspicious of potassium loss. Ringer's solution, however, will not be sufficient if a serious potassium deficiency exists.[8] Some believe that hypochloremic alkalosis is nothing but a potassium deficiency, since the hypochloremia in these patients often is resistant to sodium chloride.[5] Electrocardiographic tracings may reveal the pattern of hypokalemia.

Hypokalemia also may develop if large infusions of dextrose and especially of sodium chloride are given, as then potassium is washed out with the urine. Severe surgical trauma is another important factor in the production of hypokalemia. However, in treating the condition special care must be exercised, as the limits between normal and fatal blood levels are not very great. One Gm. of potassium chloride per liter may be given after a loss of 6 liters of gastric secretions. Along with it, the patient should receive 1 Gm. of calcium gluconate (10 cc. of 10 per cent solution).[9]

3. *Hypoproteinemia:* Most patients with gastric disease suffer from simple to severe hypoproteinemia. It is very important that the plasma proteins be raised higher than the minimum critical normal level of 5.5 Gm. for plasma and 2.5 mg. for albumin per hundred cubic centimeters of blood and kept there, as with lowering of its level an abnormal retention of fluids and edema occurs in the interstitial tissues.[6] Deficiency of 1 Gm. in blood albumin means a loss of 30 Gm. of body proteins.[10] The most outstanding symptoms are weight loss, cutaneous laxity, subcutaneous edema, impaired pulmonary, gastrointestinal and renal functions, impaired wound healing and decreased resistance to infection and trauma. Untreated, it ends in shock. Hematocrit and protein determinations, with emphasis on albumin, are essential to determine the degree of hypoproteinemia. When there is a loss of 1 Gm. of plasma albumin, it means that there has been a loss of 30 Gm. of body proteins.

In simple or moderate hypoproteinemia, a high caloric diet for several days will suffice. Varco has worked out a number of suitable diets for the purpose.[11] In severe hypoproteinemia, protein concentrates may have to be added to the diet to supply additional proteins. In some patients, even in the absence of pyloric obstruction, amino acids or casein hydrolysates may have to be administered parenterally, as they are usually unable to metabolize food properly. It has been estimated that to play safe one should not administer more than 3 liters of 5 per cent hydrolysate, which is equal to about 0.3 Gm. of nitrogen per kilogram of body weight in a man weighing 70 Kg. This amount of protein is not sufficient to replace the increased protein loss due to disease or tissue trauma, especially since the infused protein is burned as a source of energy and lost for the tissue synthesis, if the caloric requirements are not met.[12] Therefore, additional calories must be added to the amino acids. It has been estimated that to meet the basal protein requirements one should administer 25 calories per kilogram of body weight per day to an adult, which in parenteral fluids is equivalent to 3 liters of 5 per cent protolysate in 10 per cent dextrose solution in a patient weighing 70 Kg.[13] However, some patients need more calories in order to correct the protein deficiency.[14] To assure restitution of proteins and

weight gain in the same patient, it will require 30 to 40 calories per kilogram of body weight, or 3 liters of 15 per cent dextrose in 5 per cent hydrolysate per day.[15] The rate of the infusion should be 0.5 Gm. of dextrose per kilogram per hour to avoid glycosuria and diuresis,[16] and prevent local venous thrombosis. On this basis it will take about an hour and a half for a 5 per cent dextrose solution or about three hours for a 10 per cent dextrose solution in a patient weighing 70 Kg. When a hydrolysate is added to the dextrose solution, there is less glycosuria than when dextrose is given alone, as is shown by a lower blood sugar level.[16] When alimentary feeding is impossible and a large number of calories is needed, absolute alcohol may be added to the 5 per cent amigen to make up a 6 per cent alcohol solution.[17] Fat emulsion for parenteral use is still in an experimental state, but it is promising.

Since proteins and food in general are best utilized by the body when given by mouth,[18] it is best to resume oral feeding as soon as tolerated and never parenterally, if the patient can handle a high caloric diet containing large amounts of proteins, carbohydrates and a fair amount of fat and vitamins. It is extravagant to use the intravenous route when some other route of feeding—oral, orogastric or jejunal—is available, as parenterally one has to supply twice the body requirements.[19] When food is given by mouth, the nitrogen balance can be maintained by 0.3 Gm. of nitrogen and 30 calories per kilogram of body weight per day, but when it is administered parenterally, double or triple that amount is needed.[20]

Even with a high protein hospital diet, the nitrogen intake is approximately 20.8 Gm. daily,[20] the equivalent of 125 Gm. of proteins for a man weighing 70 Kg., which is not sufficient to replace the increased protein loss due to trauma or disease. There is increased loss of nitrogen even in patients with good nutritional balance, indicating that operative trauma may play a role in increasing nitrogen loss in a well-nourished patient. When patients are unable to take foods by mouth, nitrogens, such as amigen or other hydrolysates, can be given intravenously up to 0.3 Gm. nitrogen per kilogram of body weight.[20] However, if an additional amount of 0.8 Gm. of nitrogen per kilogram of body weight could be given by mouth, it would make a total of 1.1 Gm. of nitrogen per kilogram, or 500 per cent greater than the intake possible with natural foods. The use of intravenous amigen when the patient is unable to take food by mouth shortens convalescence and assists in wound healing.

External or subcutaneous edema may be only a late symptom of hypoproteinemia which has been going on for some time in vital organs. In the most severe form of hypoproteinemia, which develops insidiously over a long period of weeks because of insufficient protein intake or synthesis in diet, there is a state of chronic shock.[21] In these cases, in addition to retention of fluids in the interstitial tissues and a large loss of weight, there is also a great decrease in blood volume,[1] making it necessary to give preoperative transfusions. The amount will depend on the case—varying from 1,000 to 2,700 cc. of the whole blood per day.[22] There is little danger in overloading the vascular tree in the absence of cardiac disturbances.

The need of blood transfusion is apparent in many patients with acute shock because of repeated hemorrhages from the stomach or duodenum. They show evidences of marked secondary anemia, with hemoglobin levels as low as 20 per cent. The entire hemoglobin deficit should be corrected by whole blood, with 16.3 Gm. as the desirable standard. Blood increases oxygenation, prevents damage to liver and brain, and aids wound healing. The administration of large amounts of saline solutions to patients who have had excessive hemorrhage is dangerous and

often produces edema because of the low plasma protein concentration and the inability of the kidneys to excrete sodium.

When deficiency of both hemoglobin and tissue proteins coexists, priority is given to the synthesis of hemoglobin.[23] And, since it takes some time to regenerate his own red blood cells and hemoglobin, the patient's tissues do not obtain enough proteins to aid in wound healing. Because of this, Coller has advised restoration of the hemoglobin level before forcing the proteins. Since the hemoglobin value and the red blood cell count do not serve as an accurate index of the extent of the patient's anemia when hemoconcentration exists, one should resort to hematocrit, plasma and whole blood specific gravity determinations.[20] Blood replacement, volume for volume, should be continued until pulse and blood pressure are stabilized.

4. *Infections:* All infections should be brought under control, e.g., to prevent pulmonary and other complications. Hygiene of the mouth and gums should receive attention. In the presence of an acute infection, elective surgical procedures should be postponed.

5. *Dysfunction:* The disturbed gastrointestinal tract should be put in better order. Food in the form of protein and dextrose should be administered parenterally. When there is nausea or vomiting, suction should be used to decompress the stomach. The amount lost by suction should be noted and replaced parenterally.

Suction often reduces edema of the stomach and duodenum as well as gas collected in the small intestines. The reduction of edema cuts down operative technical difficulties and promotes better postoperative healing. The tube is shut off for an hour or two when liquids are given by mouth and the patient made ambulatory during this period. The amount of gastric residue is determined at bedtime; if it is excessive, oral feeding is discontinued. The tube may be removed at bedtime to guard against possible pulmonary infection caused by irritation. This will also insure better sleep.

Lavage of the stomach prior to operation is essential. This is done on the last preoperative day as well as on the morning of the operation. The tube is left in the stomach as the patient goes to the operating room, so that the latter may be emptied of its secretions on the operating table. In the presence of achlorhydria, lavage with hydrochloric acid may be of some value in its bacteriostatic effect.

6. *Psychosomatic Aspects:* The psyche of the patient should receive proper attention. He is emotionally upset, anxious, and often fearful of death. Any emotional upheaval disturbs the secretions and the motility of the gastrointestinal tract. Vagotomy and sedation are advocated for ulcer patients on the basis of this knowledge; then why not make use of the same knowledge in preparing these patients for operation? Beforehand the patient should be told of the common use of oxygen and transfusions and the advantages of early ambulation. If he is given a genuine idea of their value, he is not so likely to be upset when these measures are used. The hopeful side of the case should be emphasized to allay his fears further. While waiting for surgical treatment he should receive sedation. Preoperatively he should be assured of a good sleep, and amnesia-producing medication should be given before he leaves his bed for the operation. Morphine with scopolamine is an excellent premedicament in proper doses.

7. *Vitamin Deficiency:* Patients with gastric disease, because of insufficient diet or vomiting, are not only unable to obtain Vitamins B and C in any form, but they are actually losing even the meager amounts ordinarily stored in the body. The lack of Vitamin B may lead to poor functioning of the enterostomy stoma, and the lack of Vitamin C may delay its healing. In addition, Vitamin C aids in the proper distribution of fluids in the tissues and prevents pulmonary complications. If unable to take them by mouth the patient should be given them parenterally, 1 to 3 cc. of vitamin B complex and 500 or mg. of vitamin C. Vitamin K

may be necessary for patients with hypoprothrombinemia.

Irreversible Pathologic States.—A thorough physical examination will reveal any chronic pathologic states that may play an important part in the outcome of surgical treatment. These states should be appraised in the same way as the physical fitness of an athlete before he is entered in a severe physical contest. A patient with gastric disease about to undergo a major operation is not physically in the best condition; on the contrary, he is handicapped by disease and is subjected to a contest more severe than the athlete undertakes. An athlete is kept out of a contest if unfit, but a patient with a gastric lesion has to submit to treatment. He must be prepared for the struggle, and in the right way. The surgeon must be alert to all defects and deficiencies of his patient and prepared to meet all emergencies that may arise because of them.

Age: Among the irreversible pathologic states the most important is age. This is especially significant today, because more and more elderly patients must undergo gastric operations. The mortality rate rises sharply after the 50-year mark, because of disturbed physiologic states due to age alone. Elderly patients suffer from arteriosclerosis, which affects all vital functions of the body. Their chemical processes are slow, their ability for "comeback" very limited and their margin of safety very narrow. Their reactions and responses to anesthetic agents or trauma are poor. They require special care both before and after operation.

Cardiac Handicaps: If myocardial decompensation is present, it should be corrected. If coronary insufficiency is present and the cardiac reserve limited, the patient should be protected against anoxia, both during the operation and afterward, by the use of oxygen. Dextrose is a good cardiac stimulant and food for the myocardium. The volume and speed of administration of parenteral fluids should be graded according to the patient's cardiac status, since overloading the circulation may lead to cardiac failure. In some cases saline solutions may do more harm than good.

If there is impending decompensation, full digitalization may be necessary. Patients with a history of cardiac disease should have the attention of a cardiologist throughout the treatment. The electrocardiogram is of value preoperatively, especially for poor risks, as an unsuspected myocardial infarct from a previous attack may be detected. Recently some have stressed the value of electrocardiograms taken during the operative procedure so that any cardiac change, especially arrythmia, may be detected and the emergency instantly met. Every adult patient with diabetes, hypertension or myxedema should be suspected of having coronary sclerosis.

Cardiac arrythmia is not of great significance unless there is associated tachycardia or unless it is the result of myocarditis, infarction or a state of shock. Most of these can be controlled with quinidine.

Other Chronic States: Chronic kidney diseases, hypertension, syphilis, hyperthyroidism, bronchiectasis, cirrhosis of the liver, emphysema and diabetes, if present, require preoperative attention for a successful outcome. Loading of fluids in a renal case may cause edema and overhydration. Chronic emphysema predisposes to infection and pulmonary complications. Lack of oxygen in such cases causes anoxia and leads to cardiac complications. The hyperthyroid patient has to be prepared by iodine or thiouracil. The bronchiectatic patient will require constant suction of his pulmonary tree. In a hypertensive patient, a sudden drop of blood pressure may be disastrous. In a diabetic patient the dehydration is greater, as more water is being lost; this places additional demands for water, sodium, potassium. Without proper correction, acidosis develops with lower carbon dioxide values. In patients with poor hepatic function a careful watch must be kept over the changed hematologic values. This should never be neglected; it is extremely important.

POSTOPERATIVE CARE

Postoperative care should be comparatively simple and easy if all physiochemical disturbances have been adjusted before and maintained at a normal level during the operation. Postoperatively, all that has to be done is to continue the maintenance of normal balance already attained and forestall complications that may possibly develop. If the patient has been properly evaluated preoperatively, the surgeon will know what to expect and will take appropriate measures to prevent these complications.

Though this is not the place to discuss the conduct of anesthesia or the surgical technic, their important relation to preoperative and postoperative care cannot be overemphasized. Maintenance of an even pulse rate and blood pressure, proper pulmonary ventilation, tracheal suction and a properly chosen and lightly maintained anesthesia will undoubtedly prevent pulmonary edema, atelectasis, pneumonia and postoperative shock. Technically and physiologically correct surgical management, gentle handling of tissues, proper hemostasis, judicious use of clamps, avoidance of leaving dead tissue behind, and care to prevent damage to the blood supply of the viscera will forestall some of the common complications that follow gastric operations—leakage at points of anastomosis, shock, peritonitis, intestinal obstruction, and some of the more severe postgastrectomy syndromes.

In any gastrectomy there is a total loss of 500 to 700 cc. of blood, depending upon the surgeon. This depletes the patient not only of proteins but of many other valuable nutrients; and the blood loss should be replaced during the operation.

Regardless of the quality of preoperative and postoperative care, however, if the technic of the operating surgeon is not also based on the knowledge and appreciation of physiochemical science, the patient will suffer. To overlook this aspect of the matter is to invite complications and failure.

PREVENTION OF COMPLICATIONS

1. *Atelectasis.*—Immediately after the operation, deep breathing must be started. If the patient is not sufficiently awake to do his own deep breathing, carbogen should be used every few minutes. The patient should be made to cough, and if he is having difficulty in raising sputum his chest should be pounded with a fist from behind. If there is any suspicion of atelectasis because of plugging of the bronchial passageways, bronchoscopic suction should be used. A roentgenogram is of great value at this time to rule out the beginning of pneumonia or atelectasis.

2. *Thrombosis, Embolism and Abdominal Distention.*—The patient should be made to exercise his feet, legs and arms, and to sit up and turn in bed. In a day or so he should be made ambulatory if possible. No pillows should be used under his legs, nor is he to be allowed to sit up in chairs which press against the calf or the popliteal space. With early ambulation, less sedation is required and there is less abdominal distention. Because of the latter, there is less likelihood of gas pains and wound disruption. Infections of the respiratory tract are also reduced in number. Dicumarol may be necessary for patients with cardiac disease or varicose veins, especially those who have had a thromboembolic disease before are more susceptible to embolism. Prophylactic femoral ligation is rarely needed.

3. *Interstitial Edema and Shock.*—A careful watch should be kept to avoid dehydration, nor should the patients be overhydrated. Interstitial edema of the lungs, the brain, the liver, the heart or the anastomosis will be prevented by continuance of proper use of hydration, electrolytes and proteins. Since the ability of the kidneys to secrete sodium is temporarily diminished after surgical intervention, not more than 500 cc. of saline solution, if any, should be administered during the first two postoperative days. There after the amount needed will depend on the total urinary output and the

amount of sodium chloride contained in the urine. When there is need of proteins and saline solution is administered instead, it may end disastrously by producing sudden interstitial edema in vital areas.

Since the twenty-four-hour obligatory water loss is 1,500 cc. and another liter is lost by perspiration on the operating table, about 3 liters of dextrose solution will be needed to replace the loss and supply other needs. Since some protein is transported to the injured tissues, the need of proteins increases postoperatively. If plasma proteins are not maintained at a normal level, edema will take place in vital areas, including the site of anastomosis. Low serum proteins thus may nullify all efforts of surgery by causing intestinal obstruction in the stoma and damage in other organs.[24] Proteins, by going to the operatively injured parts in large quantities, promote wound healing and thus prevent wound disruption. However, if fluids are forced when it is proteins that are needed, generalized marked edema may develop.

When there is a combined loss of fluids, electrolytes and proteins (and/or blood), there is also a loss in the blood volume which must be reestablished by blood transfusion. Blood assists in wound healing by increased oxygenation and prevents damage to the liver, brain, heart and lungs.

4. *Infection.*—Too much reliance should not be placed on antibiotics to prevent infection, lest one forget that the first line of defense is the proper preparation and care of the patient in many other ways—gentleness in handling the tissues, hemostasis, sutures and proper surgical technic. The indwelling tube should be removed as early as possible to reduce the number of factors favoring pulmonary infections. Considering the patient's age, debility, and other factors, it may be desirable to use certain antibiotics both before and after operation. If symptoms of atelectasis are developing, in addition to the measures for the relief of the air passageways, antibiotics may be useful to prevent pneumonia. Streptomycin with penicillin should be administered if pneumonia is suspected.

Leakage from the anastomosis may produce localized abscess in the lesser sac or at the subphrenic area. With the very first symptoms, antibiotics should be used before an actual abscess has developed, in the hope that drainage will not become necessary. Fistulas of the duodenal stump usually develop a week after operation, requiring constant drainage by suction, with the use of a small motor. Aluminum paste around the fistulous opening alleviates the discomfort to a certain degree and prevents further excoriation of the skin.

5. *Disturbances Due to Postoperative feeding.*—There is considerable difference of opinion as to how and when patients with gastric disease should be fed postoperatively. Some institute a liquid diet early. The feedings are very small and frequent. The amount is gradually increased and the number of feedings reduced. While the intake is limited, the patient receives additional fluids and nutrients by vein. Some do not give anything by mouth until the third day. Constant suction is maintained for two or three days only. On the third or fourth day the tube is clamped off. If the amount of retained gastric secretions at the end of four hours is not more than 120 cc. the tube is removed. As the fluids and semi-soft foods by mouth are increased, the amount of parenteral feeding is reduced.

Some vigorously advocate the use of a double-lumen tube, which is placed in the efferent loop of the jejunum at surgery. I have had no personal experience with it. The advocates of jejunal feeding argue that food is best utilized from the jejunum; that the entire daily requirement can be given without resorting to parenteral alimentation; that less is required than for parenteral feeding, and that food in the jejunum stimulates and keeps up normal peristalsis, thus reducing gaseous distention and pain. When an Abbott-Rawson double tube is used,

gastric decompression is maintained by suction, the patient being fed by slow drip into the lumen of the jejunum several inches below the anastomosis. The mixture contains all necessary nutrients and vitamins.[18] The double-lumen tube sometimes is placed through a gastrectomy opening, thus relieving the patient of the discomforts and the surgeon of the fear of pulmonary infection. Whether the single-lumen or the double-lumen tube is used, oral feeding of liquids is started on the fifth day and gradually modified to a soft bland diet.

There will be less need of postoperative gastric suction and jejunal tube feeding if the patient is carefully prepared preoperatively with regard to his electrolyte and protein needs and gastrointestinal decompression long enough to reduce edema of the stomach and duodenal wall. With less edema in these structures there will be fewer technical difficulties and less fear of leakage.

6. *Postgastrectomy Syndrome:* Nearly one-third of gastrectomized patients have an early or late dumping syndrome. The syndrome varies in degree, time of onset and symptoms. The early syndrome begins about two weeks after the operation. After a meal the patient feels weakness and warmth followed by cold diaphoresis, especially about the forehead, palpitation, and a sensation of gas or gurgling in the abdomen. The attack comes on quickly and leaves very shortly. The patient is relieved by a supine position. Occasionally the syndrome is accompanied by discomfort in the upper part of the abdomen, regurgitation or vomiting, and a few have frequent bowel movements or diarrhea. Some fail to gain weight. All sorts of explanations have been advanced as to the cause. Among these are hypoglycemia, reflex vagotonia secondary to jejunal distention and faulty stoma. Rhodes caused improvement in the dumping syndrome by reducing the stoma by 5 per cent. The therapy of the syndrome is frequent, small feedings, lying down soon after eating, avoiding large amounts of liquid and ingestion of drier foods.

7. *Anemias:* Hydrochloric acid may be useful to patients with total gastrectomy. Liver extract should be administered to patients in whom postoperative anemia develops.

8. *Ulcer:* Patients who have had duodenal ulcers should be given an ulcer regimen and diet.

SUMMARY AND CONCLUSIONS

Modern gastric surgery places greater emphasis on the physiochemical disturbances caused by gastrointestinal disease, anesthetics and surgical trauma, which have to be corrected and maintained both preoperatively and postoperatively as well as during the operation. To do this requires knowledge of physiochemistry. However, the surgeon should not depend entirely on the laboratory reports. He should evaluate them in the light of the patient's history and physical examination in order to avoid serious mistakes.

Setting up routine orders for a case of surgical disease of the stomach may lead to many unnecessary or even dangerous procedures. Therefore, each individual patient's exact needs have to be determined and treated accordingly. The principles and methods whereby the surgeon can measure these needs are discussed, and types of preoperative and postoperative care suggested.

RÉSUMÉ ET CONCLUSIONS

La chirurgie contemporaine apprécie considérablement les manifestations physio-chimiques anormales, suites de maladies gastrointestinales, des anesthésiques, du traumatisme chirurgical que l'on doit connaitre pour corriger aussi bien avant et après l'intervention que pendant. Ceci demande des connaissances de chimie physiologique, cependant le chirurgien ne doit pas uniquement se fier au laboratoire. Il doit en plus estimer l'histoire clinique du patient et son état

physique pour s'éviter de commettre de graves erreurs.

Etablir d'emblée une routine peut conduire à des manoeuvres inutiles voire même dangereuses. Les besoins individuels de chaque patient doivent donc être bien déterminés et traités conséquemment. Ces principes et procédés que tout chirurgien doit considérer sont ensuite discutés, de même que leur données pré et post-opératoires.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

Die moderne Magenchirurgie legt erhoehten Wert auf die Beobachtung der physiochemischen Stoerungen, die durch Magendarmerkrankungen, durch Narkose und durch Operationstrauma entstehen, und die vor, waehrend und nach dem chirurgischen Eingriff korrigiert und reguliert werden muessen; dazu gehoeren zwar K e n n t n i s s e in physiologischer Chemie, doche sollte der Chirurg sich nicht ausschliesslich von Laboratoriumsberichten leiten lassen, sondern vielmehr, um schwere Fehler zu vermeiden, diese Befunde im Lichte der Krankheitsgeschichte und der Untersuchung am Krankenbett auswerten.

Das Aufstellen eines Schemas von Verordnungen fuer Kranke mit chirurgischen Magenleiden kann zu manchem ueberfluessigen und sogar gefaehrlichen Vorgehen fuehren. Was der einzelne Kranke braucht, muss nach individuellen Gegebenheiten genau bestimmt und bei der Durchfuehrung der Behandlung beruecksichtigt werden. Nach welchen Prinzipien und Methoden der Chirurg solche individuellen Beduerfnisse ermitteln kann, wird eroertert und Formen prae- und postoperativer Behandlung werden in Vorschlag gebracht.

RESUMEN Y CONCLUSIONES

La cirugía gástrica moderna dedica mayor atención a los trastornos fisicoquímicos por enfermedad gastrointestinal, anestésicos y trauma quirúrgico, los que deben corregirse y mantenerse tanto pre y postoperatoriamente como peroperatoriamente. Esto r e q u i e r e conocimiento fisicoquímico, pero el cirujano no debe depender enteramente de los informes del laboratorio. Debe evaluarlos de conformidad con los antecedentes y el examen físico del paciento si quiere evitarse serios errores.

La conducta rutinaria en casos de enfermedad gástrica quirúrgica pueden conducir a muchos procedimientos innecesarios y aun peligrosos. En consecuencia, deben determinarse las necesidades individuales exactas del paciente conforme a sus requerimientos. Se discuten los principios y métodos que permiten al cirujano estimar estas necesidades, sugiriéndose asimismo los tipos de atención pre y postoperatoria.

RIASSUNTO E CONCLUSIONI

Chirurgia gastrica moderna pone piu grande enfasi su i turbamenti fisiochimici causato da malattia gastro-intestinale, anestetici e trauma chirurgico, che devon' essere corretti e mantenuti entr-ambi preoperatorio e postoperatorio benche' durante l'operazione. A compire cio' richiede conoscenza di fisiochimica; il chirurgo intanto, non dovrebbe fidarsi interamente delle relazioni laboratorie. Dovrebbe valutarle nella luce del'anamnesi ed esamina fisica se evitasse abagli gravi.

Fissando ordini pratici per casi di malattia chirurgica gastrica puo' condurre a molti procedimenti inutile ed ugualmente pericoloso. Bisogna determinare le necessita' esatte del paziente individuale e trattarle secondo loro esigenze. Discute i principii e metodi tra quali il chirurgo puo' misurare questi bisogni, e suggerisce i tipi di cura pre e post-operatoria.

SUMÁRIO E CONCLUSÕES

No terreno da moderna cirurgia gástrica o estudo das perturbações fisioquímicas causadas pela enfermidade gastroduodenal, pelos anestésicos e pelo traumatismo cirúrgico assume crescente importancia devido ao interesse em corrigil-as seja no pré ou no pós-operatório ou

durante a operação. Isso requer conhecimentos de fisioquimica; o cirurgião não deve se basear intei ramente nos resultados do laboratório. Ele deve avaliar essas perturbações á luz da história e do exame físico do paciente si deseja evitar erros graves.

O estabelecimento de exames de rotina para casos de doenças gástricas cirúrgicas póde conduzir á métodos desnecessarios ou, mesmo, perigosos. As necessidades exatas de cada paciente devem ser, portanto, determinadas e propriamente tratadas.

Os princípios e métodos com os quais o cirurgião póde aquilator estas necessidades são discutidos, e tipos de cuidados pré e pos-operatórios são sugeridos pelo autor.

REFERENCES

1. Beling, C. A.; Morton, T. V., and Bosch, D. T.: Blood Volume and Other Determinations in Preoperative and Postoperative Care, Surg., Gynec., & Obst. 87:163, 1948.
2. Child, C. G., and Holswade, G. R.: Replacement and Maintenance of Water and Electrolytes and Proteins in the Surgical Patient, Surg. Clin. North America 30:315-347, 1950.
3. Coller, F. A., and DeWeese, M.S.: Preoperative and Postoperative Care, J.A.M.A. 141:641, 1949.
4. Irenus, C. Jr.: Hypochloremic State in Surgical Patients, Surgery 18:582-591, 1945.
5. Randal, H. T.; Habif, D. V., Lockwood, J. E., and Werner, S. C.: Potassium Deficiency in Surgical Patients, Surgery 26:341-363, 1949.
6. Maddock, W. G.: Parenteral Use of Water, Dextrose, Electrolytes, Fats and Vitamins, Arch. Surg. 57:553, 1948.
7. Zintel, H. A.; Rhoades, J. E., and Ravdin, I. S.: Use of Intravenous Sodium Chloride in the Treatment of Alkalosis, Surgery 14:728, 1943.
8. Lockwood, J. S.: Postoperative Deaths, Ann. Surg. 130:589, 1949.
9. Lyon, R. P.: Prevention of the Fluid-Electrolyte "Problem" by Simple Means, California Med. 73:303-306, 1950.
10. Elman, R.: Acute Starvation Following Operation or Injury with Special Reference to Caloric and Protein Needs, Ann. Surg. 120:350, 1944. Elman, R.; Davey, H. and Kiyasu, R.: Nitrogen Balance and Restricted Caloric Intake, J. Lab. & Clin. Med. 30:273-277, 1945.
11. Varco, R. L.: Preoperative Dietary Management for Surgical Patients, Surgery 19:303-378, 1946.
12. Brunschwig, A.; Clark, D. E., and Corbin, N.: Postoperative Nitrogen Loss and Studies of Parenteral Nitrogen Nutrition by Means of Casein Digests, Ann. Surg. 115:1091, 1942.
13. Butler, A. M., and Talbot, N. B.: Parenteral Fluid Theory: 1. Estimation and Provision of Daily Maintenance Requirements, New Eng. J. Med. 231:585, 1944.
14. Lund, C. C., and Levenson, S. M.: Protein in Surgery, J.A.M.A. 128:95, 1945.
15. Ellison, E. H.; McCleery, R. S.; Zollinger, R. M., and Case, C. T.: The Influence of Caloric Intake Upon the Fate of Parenteral Nitrogen, Surgery 26:374-383, 1949.
16. Lockhart, C. E., and Elman, R.: The Effect of Intravenous Glucose and Amino Acids on Gycosuria and Urinary Output in Humans, Surg., Gynec. & Obst. 88:97, 1949.
17. Kremen, A. J.: The Problem of Parenteral Nitrogen Administration in Surgical Patients, Surgery 23:92, 1948.
18. Stewart, J. D.; Hale, H. W., and Schaer, S. M.: Management of Protein Deficiency in Surgical Patients, J.A.M.A. 136:1017, 1948.
19. Ravdin, I. S.: Nitrogen Balance, Surgery 24:1035, 1948. Stewart et al.[18]
20. Tui, C.: The Value of Protein and Its Chemical Components (Amino Acids) in Surgical Repair, Bull. N. Y. Acad. Med. 21:631-653, 1945.
21. Clark, J. H.: Nelson, W.; Lyons, C., Mayerson, H. S., and DeCamp, P.: Chronic Shock, Ann. Surg. 125:618-646, 1947.
22. Nicholson, M. J.: Preoperative Preparation and Premedication, Surg. Clin. North America 30:635-647, 1950.
23. Whipple, G. H.: Hemoglobin and Plasma Proteins: Their Production, Utilization and Interrelation, Am. J. Med. Sc. 203:477, 1942.
24. Whipple;[23] Jones and Eaton.[22]

ADDITIONAL SOURCES

Andresen, A. R. R., Diet after Operations on the Stomach, Am. J. Surg. 10:448-451, 1930.

Aquina, S., and Butsch, W.: Use of Plasma Volume Determination as a Guide to Saline Administration in Surgical Patients, Surg., Gynec. & Obst. 91:311-322, 1950.

Berry, R. E. L., Iob, V., and Campbell, K. N.: Potassium Metabolism in the Immediate Postoperative Period, Arch. Surg. 57:470-478, 1948.

Ferguson, L. K.: Simplicity in Surgery, Surg., Gynec. & Obst. 88:539, 1949.

Gamble, J. J.: Chemical Anatomy, Physiology and Pathology of Extracellular Fluid. Cambridge, Mass.: Harvard University Press, 1947.

Heublein, G. W.; Thompson, W. D. Jr., and Scully, J. P.: Effect of Vitamin in B Complex Deficiency on Gastric Emptying and Small Intestinal Motility, Am. J. Roentgenol. 46:866, 1941.

Jones, T. E., and Kehm, R. W.: Total Gastrectomy, Surg., Gynec. & Obst. 80:534, 1945.

Lahey, Frank H.: Operative and Postoperative Complications, Surg. Clin. North America 30: 785-797, 1950.

Longmire, W. P. Jr.: Total Gastrectomy for Cancer of the Stomach, Surg., Gynec. & Obst. 84:21, 1947.

Maier, H. C.: Preoperative, Operative and Postoperative Care in Esophageal Resections, Surgery 23:884, 1948.

McInnes, G. F.; Bodansky, O., and Brunschig, A.: Blood Volume and Blood Biochemical Studies in Patients Undergoing Radical Surgery, Surg., Gynec. & Obst. 91:323-332, 1950.

Mecray, P. M.; Barden, R. P., and Ravdin, I. S.: Nutritional Edema, Its Effect on the Gastric Emptying Time Before and After Gastric Operations, Surgery 1:53-64, 1937.

Muir, A.: Postgastrectomy Syndromes, Brit. J. Surg. 37:165, 1949.

Rhoads, J. E.: The Surgical Physiology of the Gastrointestinal Tract, Surg. Clin. North America 29:1763, 1949.

Scott, H. W. Jr., and Longmire, W. P. Jr.: Total Gastrectomy, Surgery 26:488, 1949.

Stare, F. J., and Thorn, W. G.: Protein Nutrition in Problems of Medical Interest, J.A.M.A. 127:1120, 1945.

Sweet, R. H.: Treatment of Carcinoma of Esophagus and Cardiac End of Stomach by Surgical Extirpation, Surgery 23:952, 1948.

Wangensteen, O. H.: Care of the Patient Before and After Operations, New England J. Med. 236:121-129, 1947.

Whipple, A. O.: Determining Factors in the Safety and Success of Present-Day Radical Surgery, Surgery 25:169, 1949.

Wood, F. C.: Cardiac Problems in the Surgical Patient, Surg. Clin. North America, 30: 1755-1762, 1949.

Riegel, C.; Koop, C. E.; Grigger, R. P.; Rhoads, J. E., and Bullitt, L.: The Protein Requirements of Surgical Patients During the Postoperative Period, Surg. Clin. North America 25:1096-1105, 1945.

Sullivan, A. Jr.: Studies of One Hundred Fifty-one Patients at the University Hospital in Relation to Their Daily Weight Fluctuations, Surgery 24:939-943, 1948.

Grimes, O. F.: Gastric Resection—Preoperative and Postoperative Care, California Med. 73:159-161, 1950.

Lockwood, J. S., and Randall, H. T.: Bull. N. Y. Acad. Med. 25:228, 1949.

Shidler, F. P.: Considerations of Postoperative Electrolyte and Fluid Replacement; California Med. 73:309-311, 1950.

The Sixteenth Annual Assembly
of the United States Chapter
International College of Surgeons

will be held at the Palmer House in Chicago
September 10-14, 1951

For details, write
Dr. Arnold S. Jackson, *Secretary*
United States Chapter, International College of Surgeons
1516 Lake Shore Drive, Chicago 10, Illinois

Treatment of Trichomonas Vaginalis Vaginitis

II. Factors Affecting Response To Treatment

WALTER J. REICH, M.D., F.A.C.S., F.I.C.S.*
HELEN L. BUTTON, M.D., F.I.C.S., AND MITCHELL J. NECHTOW, M.D.
CHICAGO

A LITTLE over seven years ago an investigation was begun in the outpatient gynecologic clinic at Cook County Hospital, Chicago, which had for its objective a method of treatment of vaginal trichomoniasis more effective than previous treatment and more dependable in the prevention of recurrence.

At an early stage it became apparent that more was involved than the development of an effective therapeutic agent. A *procedure* of treatment had to be worked out, taking into account the habits and limitations of the patient, the recognizable and preventable sources of reinfection, and the factors contributing to resistance to treatment and recurrence of the condition.

A procedure was developed in 1945 and was subjected to a test previously reported,[1] which proved to be successful in 98 or more of every hundred cases of Trichomonas vaginalis vaginitis carried to completion at this clinic.

From the point of view of research, this degree of closeness of approach to 100 per cent effectiveness has had the disadvantage of a very small number of failures accruing to provide answers as to why treatment is not always successful and how it can be further improved. It has taken us five years, and the examination and study of many hundreds of patients, to complete the study of the failures which form the nucleus of this report.

The history, clinical data and course of treatment for these failures are here examined against the background history, etc., of the cases in which there appeared to be no resistance to treatment, and the intermediate cases in which there was some resistance, requiring some prolongation of treatment to achieve a successful end result.

Methods.—The treatment procedure remained continuously as earlier described[1] except for the reduction in dosage described in Table 1. It consisted of search for and elimination of foci and sources of reinfection, together with use of argypulvis (finely powdered argyrol, kaolin and lactose) by insufflation at the time of examination, and as a capsule inserted nightly in the vagina after a preliminary douche with 4 tablespoonfuls of white vinegar in 2 quarts of warm water.

The principal physical sources of reinfection looked for, and appropriately treated or corrected if possible when found, were the cervix, the endocervix, Skene's ducts, Bartholin's glands, the bladder and urethra, and the rectum. The patient's toilet hygiene, bathing hygiene and marriage partner were also responsible in some instances.

The patient was asked to return for reexamination one week from the day of beginning treatment. No capsule was inserted on the night before reexamination. Only the douche was taken. After the reexamination a second insufflation was

From the Gynecological Division of the Fantus Clinics, Cook County Hospital; the Cook County Graduate School of Medicine, and the Chicago Medical School.

*Attending Gynecologist, Cook County Hospital; Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Fantus Clinics of the Cook County Hospital; Assistant Professor of Gynecology, Chicago Medical School; Attending Gynecologist and Obstetrician, Grant Hospital; Attending Gynecologist, Fox River Tuberculosis Sanitorium; Consulting Gynecologist, Hazelcrest General Hospital.

Submitted for publication May 16, 1951.

TABLE 1.—*Equivalence of Response to 2 and 4 Gm. Dosages*

	4 Gm. series	2 Gm. series
Number of cases	158	194
2 or more "recurrences" before completion of treatment, %	5.1	4.6
Failures, %	1.9	1.0

given and the patient again instructed to return at week's end, insert the capsules nightly, etc., for such additional time as appeared to be individually indicated. No more than three weeks of treatment was given except when an extension of treatment appeared to be required on the basis of an incompletely established result.

The patients were urged not to interrupt treatment during the menstrual period. Treatment usually was frequently interrupted, and at times for long periods, because of incomplete cooperation on the part of the patient. Authorized interruption for eight weeks was permitted at the first indication that a complete result had been obtained, and treatment was discontinued when examination at the end of an interruption lasting eight weeks or more showed no return of trichomonads or symptoms.

The average time lapse between presentation for treatment and closing of the case as "complete" was twenty-two weeks for patients in the completed cases free of the complication of recurrence, and forty-five weeks for the remainder.

Individual records were kept, detailing, as far as was pertinent and practicable, the patient's age, color, marital status, and history; the observations at the time of examination; the treatment given, and the course of recovery.

Difficulty is encountered, in studies made under clinical conditions, in securing the return of the patient for reexamination, continuation of treatment, and confirmation of observation on a set schedule. A large percentage of patients fail to come back at all, presumably because one week of treatment is, in many cases, all that is required for elimination of trichomonads and relief of symptoms, and many patients feel no motivation toward return unless there is need for immediate help. Fewer than one third of treated patients return for a full schedule of treatment, and only a part of these continue to return for checkup.

We obtained a total of 352 records which appeared to be sufficiently comprehensive for the comparisons to be reported.

For the evaluation of these records it was recognized that no statistically cogent comparisons were possible, because of the variation of the material, the variation in faithfulness of adherence to direction, the number of observers involved, the overall limitations of clinical procedure, the complexity of the problem, and the smallness of the total group in which an unsuccessful result was recorded. With only 5 proved failures over a five-year period, all that could be attempted was a sifting of factors that appeared to have no influence on the result from factors that clearly had a direct effect.

It also was recognized that, although a positive observation of trichomonads in the vagina is conclusive, in the absence of contamination by the investigator at the time of testing, a negative test result can be considered conclusive only to the extent supported by the later observations and the clinical course.

Johnson and his associates[3] have shown that fluctuations in the vaginal trichomonad population occur in untreated, experimentally infected monkeys, with peaks three to five days before or after the menstrual flow. Williams[4] has been able to demonstrate, through a culture technic, that trichomonads may persist in the vaginas of such monkeys even when they escape microscopic detection. Hartman[5] has found a culture technic considerably more dependable than the hanging drop technic as a method of establishing the absence of trichomonads. (One out of every 5 negative results obtained by the hanging drop test proved to be positive by the culture technic.) The hanging drop technic remains, of course, the one most practical for routine check.

Seventeen of the 352 records showed instances of repeated "recurrence" during the course of treatment, which probably were, at least in some part, flare-ups, during the menstrual period, of an infection still not completely eradicated. Conclusions as to control of the infection are drawn only on the basis of continued negative microscopic observations during the treatment period and over the test interruption period of eight weeks or longer, together with a clinical result warranting such interruption.

Results.—Dosage: As may be noted in Table 1, some of the patients had been given capsules containing 4 Gm. of argypulvis for nightly insertion, and the remainder had been given capsules containing 2 Gm. The 2-Gm. series was carried through after the 4-Gm. series and benefited to some extent from increased experience.

The number of failures at the 4-Gm. level was 3 of 158, or 1.9 per cent; and at the 2-Gm. level, 2 of 194, or 1 per cent. Clearly the 2-Gm. dose was as effective as the 4-Gm. dose and no need exists for insertion of more than one 2-Gm. capsule nightly. Insertion of more than one capsule reduces the amount of moisture available per capsule to an extent interfering with effective disintegration and dispersion. The preliminary douche, before insertion of the capsule, helps to make certain that adequate moisture will be available.

TABLE 2.—*Absence of Treatment Failures with Patients Aged 40 or Above*

Age	Number of Cases	% Given Treatment for More than 3 weeks	6 weeks	12 weeks	% of failures
15-19	14	21	7	0	0
20-24	53	42	6	0	0
25-29	66	47	9	4.4	1.5
30-34	68	53	16	7.4	3.0
35-39	42	57	17	2.4	2.4
40-44	44	45	14	0	0
45-49	30	47	17	0	0
50-67	19	58	5	0	0
No age given	18	61	11	5.6	5.6

Occasional complaints were received that the capsules did not "dissolve". This lends emphasis to the need for strict adherence to instruction, including the preliminary douche, particularly when dryness is present.

Age and Color: The percentages of Negro and white patients were 83 and 17 respectively. The age distribution is recorded in Table 2.

Approximately one-half of the patients were in the age group between 25 and 39. All those in whose cases the treatment failed were in this group. No failures were observed in patients under 25 or over 39, nor were there any in this group who required unusually prolonged treatment.

Hysterectomy: The patients with records of hysterectomy prior to beginning of treatment showed a higher proportionate incidence of resistance to treatment, and failure, than did any other group in this series. In every instance of resistance to treatment and of failure, these results were associated with supracervical hysterectomy, the age of the patient being 25 to 39 and the hysterectomy having been performed as recently as four to twelve weeks prior to the beginning of treatment. So great was the contributing influence of this single factor that the percentile failure for the group with hysterectomy within twelve weeks of beginning treatment, and of an age less than 40, reached the very high figure of 30.

In contrast, only 0.4 per cent of the group with no record of recent hysterectomy and of an age less than 40 were failures.

The influence of hysterectomy on the outcome may have been in some way due to creation of a resistant trichomonad focus in the persisting cervical stump in the instances of failure.

We are now gathering cases of recent supracervical hysterectomy for swab applicator culture of the residual endocervix. Hartman[5] has observed that trichomonads sometimes can be found in this location with his culture technic, even when not

demonstrable in the vagina. When positive results are obtained for trichomonads, the cautery will be employed to reduce and perhaps remove the focus of this possible source of resistant infection, before routine argypulvis insufflation is begun.

The *initial vaginal* pH determined with nitrazine paper as described in an earlier report[1] was not recorded for every patient. Of the total of 305 with such records, 147 had a *p*H, adjacent to the cervix, below 6; for 158 the *p*H was between 6 and 7.5. All of the failures occurred in the group with an initial *p*H below 6 (see Table 4).

Certainly, mild acidity is not in itself capable of eradicating trichomonas infection, and the theory that simple correction of the vaginal *p*H to normal, in instances of trichomonas infection, may be relied upon to eliminate the infection is not in harmony with the facts. The vaginal *p*H was within the normal range in some of our most resistant trichomonad infections.

Presence of discharge: In the absence of recent hysterectomy, this did not appear to be associated with any materially higher incidence either of resistance to treatment or of failure than was observed for the series as a whole (Table 5).

The incidence of failures among women who had never been pregnant and who had no record of recent hysterectomy was zero, as compared with the 1 per cent incidence of failure for those who had been pregnant once or oftener. No treatment failures were observed in the *non-surgical* cases in association with *endocervicitis, cervicitis, erosion, nabothian cyst, ovarian cyst,* or *uterine fibroids.* However, a heightened percentage of cases in which 2 or more recurrences took place before completion of treatment was observed in the group with endocervicitis, which confirmed the clinical impression that the presence of endocervicitis makes eradication of a superimposed vaginal trichomonad infection more difficult.[6]

Reinfection: In some of the instances of recurrence, gaps of as long as seventeen to forty-two weeks were observed over which the patient remained trichomonas-negative and yet came back with a return of the infection. In these instances, the suggestion, of reinfection from without was difficult of confirmation. No provision was available in the clinic for concomitant examination of the marriage partner, and in 2 instances, when some other arrangement was made for examination of the partner, the patient herself failed to return for further treatment and study. There can be no doubt that the marriage partner is one of the background factors accounting for this type of recurrence, since we have encountered in our private practice several instances of trichomonads in the male, e.g., in the prostatic secretion, the urine, or the seminal fluid.

TABLE 3.—*Recent* Hysterectomy as a Factor Interfering with Effectiveness of Treatment in Patients Aged Less than* 40

Age at Time of Hysterectomy	Number of Cases	% Given Treatment for More than 3 weeks	6 weeks	12 weeks	% of Failures
Less than 40	10	80	60	50	30
40-67	12	75	33	0	0
Cases with no record of recent hysterectomy: Less than 40	233	41	9	2	0.4

*Within 4 to 13 weeks of the beginning of treatment. Three additional patients aged 30-39, with hysterectomy 2-6 years before beginning treatment, had an average length of treatment 3.7 weeks, with no failures; 8 additional cases of age 40-67, with hysterectomy 6 months to 7 years before, had an average length of treatment of 4.5 weeks, with no failures.

TABLE 4.—*Presence of a Vaginal pH below* 6, *at Time of Beginning Treatment, in All Instances of Failure*

	pH at Beginning Treatment	No. of Cases	% of Failures
No record of recent hysterectomy	Below 6	136	1.5
	6-7.5	150	0
Record of recent hysterectomy	Below 6	11	27.3
	6-7.5	8	0

TABLE 5.—*Relation of result to obstetrical history, presence of discharge at time of beginning treatment, presence of endocervicitis, cervicitis, erosion, Nabothian cysts, ovarian cyst or uterine fibroids. *Only those cases with no record of recent hysterectomy*

	Number of Cases	% with 2 or More "Recurrences" Before Completion of Treatment	% Failures
All cases (except those with record of recent hysterectomy	330	3.6	0.6
Presence of discharge	117	4.3	.9
Gravida 0	89	3.4	0
Gravida 1 or more	198	3.0	1.0
Endocervicitis	27	11.1	0
Cervicitis	23	4.3	0
Erosion	28	3.6	0
Nabothian cysts	8	0	0
Ovarian cyst	10	0	0
Uterine fibroids	56	3.6	0

*The data in this table concern only the cases in which there was no record of recent hysterectomy.

Hygiene: Explicit and careful instruction of the patient is vitally necessary, even on such elementary points of toilet hygiene, etc., as are outlined in references in our earlier publications.[7] It is our impression that either inadequate instruction or carelessness on the part of the patient as to continuity of treatment, faithful return for reexamination and check, and care to avoid infection, is responsible in many instances for apparent resistance to treatment.

Kessel and Thompson have recently observed[8] that T. vaginalis remains active in droplets of discharge for at least forty-five minutes. They have pointed out that towels, washcloths, toilets and bathtubs may contribute to the transmission of the parasite.

An instance of apparent transmission from a mother to a daughter 4 or 5 years old, probably as a result of bathing together in the same tub, has been under the care of one of us, as an infection superimposed on the introduction of a foreign body and recognized by vaginoscopic study.

An instance of ear infection and discharge, from which T. vaginalis was isolated, has come to attention,[9] demonstrating further the ability of this organism to survive in and adapt to locations other than the vagina.

Complete success in the treatment of Trichomonas vaginitis can be obtained only through complete awareness of all the factors contributing to its persistence and recurrence, and a program of treatment shaped accordingly.

REPORT OF CASES RECORDED AS FAILURES

CASE 1.—An unmarried Negress aged 31 had undergone supracervical hysterectomy, right salpingoophorectomy and left salpingectomy on July 23, 1945. The vaginal *p*H at the beginning of treatment (October 12 of the same year) was 5. The cervix was soft, freely movable and pointing downward in the midline. The patient was treated and discharged. The first reexamination revealed no trichomonads, but recurrences took place on Nov. 2 and Dec. 21, 1945, and also on Feb. 15, March 8 and April 26, 1946.

CASE 2.—A married Negress aged 38, who had been pregnant three times and had borne 1 child (2 miscarriages) underwent supracervical hysterectomy with bilateral salpingectomy on Nov. 2, 1944. She was treated and discharged. The vaginal *p*H at the beginning of treatment (December 13 of the same year) was 5.5. The first reexamination revealed no trichomonads, but recurrences were noted on Jan. 17 and April 11, 1945, and on March 27, 1946. She was treated by cauterization on March 27, and the usual treatment was resumed on April 3. She remained free of the parasites through May 28, but there was a recurrence on July 10.

CASE 3.—A Negress aged 32 (marital status not given) was subjected to supracervical hysterectomy on July 15, 1945. She was treated and discharged. There was a record of treatment for condyloma acuminata. The vaginal *p*H at the beginning of treatment (Sept. 19, 1945) was 4.5. There was some question as to whether this patient followed directions faithfully. The first reexamination revealed no trichomonads. Recurrences took place on Nov. 7 and Dec. 12, 1945, and on Jan. 16 and Aug. 21, 1946.

CASE 4.—A Negress aged 29, married, had never been pregnant. One year prior to ex-

amination she had had a left tubal ovarian abscess and had undergone exploratory laparotomy. The vaginal *p*H at the beginning of treatment (Sept. 11, 1946) was 4.5. The first reexamination revealed no trichomonads, nor were any present after the next mentrual period. Her husband died on November 13. A positive result was obtained from a test for trichonomads on December 4. The patient did not return to the clinic until Aug. 20, 1947. She came again on Nov. 11, 1948. On both occasions the results of the test were positive. Treatment was resumed and negative results were once more obtained, but recurrences took place on March 3, April 21 and July 21.

CASE 5.—A patient of undetermined age, twice pregnant and the mother of 2 children, had undergone a gynecologic operation of undetermined date and extent. There was induration of the right and left adnexae. The vaginal *p*H at the beginning of treatment was 4.5. The first reexamination revealed no trichomonads. The results of all tests remained negative from June 1 through August 10 (ten weeks) without treatment, but were again positive on October 26. Further recurrences took place on Jan. 25, March 1, May 11 and July 26, 1950. On May 11 the following note was made: "Patient very drunk and does not follow instructions well."

SUMMARY

The history, clinical data, course of treatment and outcome are compared in a series of 352 cases of Trichomonas vaginalis vaginitis. The high percentage of successful results with the argypulvis procedure is confirmed. Three and probably 4 of the total of 5 treatment failures were associated with a history of recent supracervical hysterectomy. All of the failures occurred in patients aged from 25 to 39, with a vaginal *p*H below 6 at beginning of treatment. Recommendations are given with a view to increasing the expectancy of satisfactory results.

RÉSUMÉ

L'auteur rapporte l'histoire clinique, les constatations morbides, l'évolution clinique et le traitement d'une série de 352 cas de vaginite à trichomonas. Le traitement par la poudre d'argyrol en pulvérisation est le traitement recommandé à cause des excellents résultats. Les trois ou quatre cas d'échecs sont survenus chez des malades qui avaient subi une hystérectomie sub-totale. On note aussi comme cause d'échec, l'âge- entre 25 et 39 ans- , un PH vaginal à 6. On recommande cependant d'attendre davantage avant de se prononcer sur le traitement.

ZUSAMMENFASSUNG

352 Faelle von durch Trichomonas vaginalis hervorgerufener Scheidenentzuendung werden bezueglich der Krankengeschichte, des Krankheitsverlaufs und der Endergebnisse verglichen. Der hohe Prozentsatz erfolgreicher Resultate mit der Argypulvismethode wird bestaetigt. In drei und wahrscheinlich vier von den insgesamt fuenf Versagern der Behandlung lag die Anamnese einer kuerzlichen suprazervikalen Gebaermutterresektion vor. Saemtliche Versager betrafen Frauen im Alter von 25 bis 39 Jahren und zeigten beim Beginn der Behandlung eine Wasserstoffionenkonzentration in der Scheide von unter sechs. Es werden Vorschlaege gemacht, die zu einem weiteren Ansteigenden Dex guenstigen Resultate fuehren koennen.

SUMÁRIO

A historia, achados, curso de tratamento e resultados são comparados em uma série de 352 casos de vaginites por Trichomonas vaginalis.

A alta percentagem de resultados favoraveis com o argypulvis é confirmada. Tres, e provavelmente quatro, do total de 5 tratamentos fracassados estavam associados com a historia de recente histerectomia supravaginal. Todos os fracassos registrados estavam em associação com idades de 25 a 39 anos e pH vaginal abaixo de 6, ao tempo do inicio do tratamento. Recomendaçóes são dadas povia ulterior obtenção de melhóres resultados.

RESUMEN

Se comparan antecedentes, hallazgos, progreso terapéutico y resultados en una serie de 352 casos de vaginitis por tricomonas. Se confirma el alto porcentaje de resultados saitsfactorios con el procedimiento argipulvis. En cinco fracasos terapéuticos, de tres a cuatro casos se encontraron con antecedentes de histerectomía subtotal reciente. Todos los fracasos ocurrieron en enfermas de 25 a 39 años de edad y pH vaginal inferior a 6 al iniciarse el tratamiento. Se hacen recomendaciones con el fin de aumentar el resultado satisfactorio.

RIASSUNTO

La storia i reperti, il trattamento ed i risultati sono considerati in una serie di 352 casi di vaginite da Trichomonas vaginalis. L'alta percentualità di risultati favorevoli con il trattamento di argypulvis é confermata.

Dei cinque insuccessi tre e probabilmente quattro sono in rapporto con la storia di isterectomia sopravaginale. Gl'insuccessi si sono verificati in soggetti fra i 25 ed i 29 anni e con pH vaginale al di sotto di 6 all'epoca dell'inizio del trattamento. Sono forniti consigli per incrementare ulteriormente la bontà dei risultati.

REFERENCES

1. Reich, W. J.; Button, H. L., and Nechtow, M. J.: Treatment of Trichomonas Vaginalis Vaginitis, Surg., Gynec. & Obst. 84:891, 1947.
2. Reich, W. J., and Nechtow, M. J.: Practical Gynecology. Philadelphia: J. B. Lippincott Co., 1950, pp. 256-264.
3. Johnson, G.; Kupferberg, A. B., and Hartman, C. G.: Cyclic Changes in Vaginal Populations of Experimentally Induced Trichomonas Vaginalis Infections in Rhesus Monkeys. Am. J. Obst. & Gynec. 59:689, 1950.
4. Williams, M. H.: A Study of the Trichomonad Population in Experimentally Infected Rhesus Monkeys: 1. The Efficiency of Intensive Microscopic Search Compared to Culture Technique, Am. J. Obst. & Gynec. 60:224, 1950.
5. Hartman, E. Stritch (Loyalo University) School of Medicine, Chicago: Personal communication.
6. Queries and Minor Notes: Trichomonas Vaginitis, J.A.M.A. 142:689, 1950.
7. Reich, Button and Nechtow.[1] Reich and Nechtow.[2]
8. Kessel, J. F., and Thompson, C. F.: Survival of Trichomonas Vaginalis in Vaginal Discharge, Proc. Soc. Exper. Biol. & Med. 74:755, 1950.
9. Ecklund, Effie M.: Personal communication. Report of related case, Campbell, P. A.: Diagnosis and Treatment of External Otitis, Ill. M. J. 93:98, 1948.

LA PRESSE MEDICALE

La Grand Journal Français de Chirurgie et de Medicine parait chaque semaine, et donne toutes les informations scientifiques et professionelles

ABONNEMENT

$11.00 par an.

Priére d'envoyer directement le montant de l'abonnement à:

LA PRESSE MEDICALE, Masson et Cie, éditeurs

120 Boulevard St. Germain Paris VI, France

Compression Fixation Arthrodesis of the Knee

ARTHUR A. MICHELE, M.D., AND FREDERICK J. KRUEGER, M.D.
STATEN ISLAND, NEW YORK

CONTACT compression and fixation in arthrodesis of the knee can be secured by a double loop steel wire. The antibiotics, as an adjuvant to therapy, have minimized the possibility of spread and facilitate the control of infection. Transfixing pins of the Steinman type, placed at a distance from the site of the arthrodesis, have often caused extension of an infection and further complications due to pressure necrosis. Transfixation by turnbuckle or similar apparatus is often too far removed from the site of the operation for firm and adequate mechanical fixation. The introduction of the Smith-Petersen nail through the site of arthrodesis may have merit if full extension is the position of choice; nevertheless it provides solely for fixation without compression.[1]

The operative technic of using the double loop of stainless steel wire is presented, as well as a case illustrating the authors' method.

Method. — The selection of cases is not important; this method can be used in any case in which conditions are suitable for arthrodesis. It affords wide excision of pathologic tissue and still permits postoperative alignment and fixation.

The knee is exposed under tourniquet control. The type of approach is selected depending upon the number and location of sinus tracts. We prefer the split patella approach of Jones and Brackett, although the "U" approach of Kocher may also have its merits. The patella is removed and can be used for bone grafts when not diseased; otherwise autogenous or homogenous iliac bone is recommended for struts and defects. After removal of the patella, the joint is debrided and all sinus tracts excised. All pathologic bone is removed to a satisfactory level or plateau for fusion. With a wide osteotome, the juxta-articular surfaces are prepared for the desired angle of approximation, which is usually 15 degrees of knee flexion. A No. 1 drill is then used, two complete transverse channels being made across each of the bone ends (Fig. 1) for threading the double loop of wire. The channels nearest the approximated ends are placed slightly anteriorly and approximately $\frac{5}{8}$ inch (1.6 cm.) from the bone ends. The channels away from the approximated ends are placed slightly more posteriorly and approximately $1\frac{1}{2}$ to 2 inches (3.8 to 5 cm.) from the bone ends. No. 22 stainless steel wire is then threaded through these drill holes in double loop fashion, as illustrated. The knee is placed in its elected position of flexion and the wires drawn as tightly as possible and secured by twisting the ends. It will be found that this holds the knee fairly solidly in position. Bear in mind, however, that as the long lever ends of the femur and the tibia are cancellous bone, it is necessary to use a support hip spica for immobilization with a cast. After the wiring is completed, an osteotome or circular saw is used to cut slots vertically across the fusion site, (see illustration), and these slots are then packed with either cancellous iliac slivers or slivers prepared from the removed patella. The tourniquet is then temporarily released to secure proper hemostasis. The wound is closed with No. 00 chromic catgut for muscle and fascial layers; No. 00 plain catgut is used for ties and subcutaneous layers, and No. 24 cotton for the skin. No. 24 cotton can be used for the entire procedure. A moderate amount of sterile mechanics' waste is placed about the knee; then sterile sheetwadding is ap-

From the Department of Orthopedic Surgery, New York Medical College, and the United States Marine Hospital, Staten Island, New York.
Submitted for publication Feb. 12, 1951.

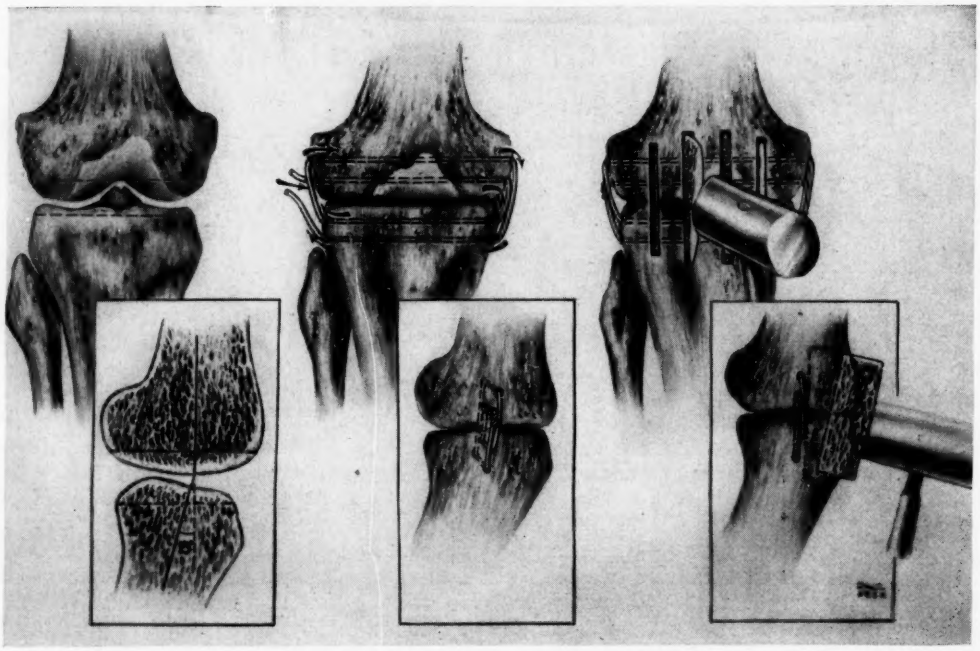


Fig. 1.—Method of double loop stainless steel wire compression-fixation arthrodesis of the knee.

plied over this. A long leg cast with hip spica is applied. At the end of the fourth week the spica is removed, the wound dressed and a long-leg walking cast applied. The patient is allowed to bear weight at the beginning of the fifth week. In the eighth to tenth week the cast is removed, control roentgenograms taken, and physical therapy applied to the foot and leg muscles. By the third month the knee is sufficiently solid for weight bearing.

Aided by the use of antibiotics, the wounds of our patients have healed per primam, all existing sinuses having closed promptly after surgical intervention.

CASE REPORT

J. R., a 27-year-old white seaman, was admitted to the United States Marine Hospital, Staten Island, New York, in March 1947. The history revealed recurrent painful swelling in the patient's right knee during 1945. The pain gradually disappeared during 1946, but the swelling remained. There had been increasing stiffness of the joint, and weight bearing had become painless though restricted. No therapy other than the application of elastic bandages had been used. Three months prior to hospitalization for this ailment, the patient's knee developed three draining sinuses almost simultaneously, one anteromedial, one anterolateral and one posterolateral, all at the level of the knee joint. Three months prior to the development of these draining sinuses he had had rather severe osteoscopic night pains, particularly acute at the distal end of the right femur and at the proximal end of the right tibia. These pains were usually relieved by some motion of the knee and disappeared when drainage started.

The system review revealed a positive history of syphilis five years prior to admission. This was treated by twelve arm shots and thirteen hip shots at intervals during 1942. No subsequent antisyphilitic therapy had been administered. There was no history of either trauma or infection other than syphilis.

Physical examination on admission revealed

a range of painless motion from 130 to 150 degrees, the same effect as that achieved on weight bearing. There was a fusiform swelling with draining sinuses, as described. The knee was markedly unstable, and there was loud, rough, crunchy crepitus on passive motion. As compared with the other knee no tenderness or discoloration was noted. There was no notable change in temperature.

Laboratory tests revealed a battery of positive serologic reactions, including the Mazzini and Kahn. The spinal fluid showed a 4 plus positive Mazzini reaction and a colloidal gold curve of 1122321000, a lymphocyte count of 27 and a total protein level of 41. The rest of the laboratory data were not remarkable except that the sedimentation rate was 28 mm. in one hour (Cutler method).

Except for the absence of knee and ankle jerks, the neurologic examination gave normal results.

Two weeks before the arthrodesis the patient was given a six-day course of intramuscular penicillin, totaling 5.4 million units.

On April 1, 1947, the joint debridement and arthrodesis was performed in the manner previously described. Gross observations at the time of the operation revealed a markedly degenerated knee containing a dense yellowish synovium with multiple grapelike clusters of villi, many of which were floating free as loose bodies. The sinuses communicated with the joint. Islands of granulation tissue were present about the sinus tracts as far as the synovium. There was practically no normal cartilage left on the sufaces of the joint. Marked chondromalacia was present, with multiple excavated areas. As much as possible of the synovia was removed, as was the necrotic cartilage and bone, and the arthrodesis was completed.

Pathologic study revealed characteristic

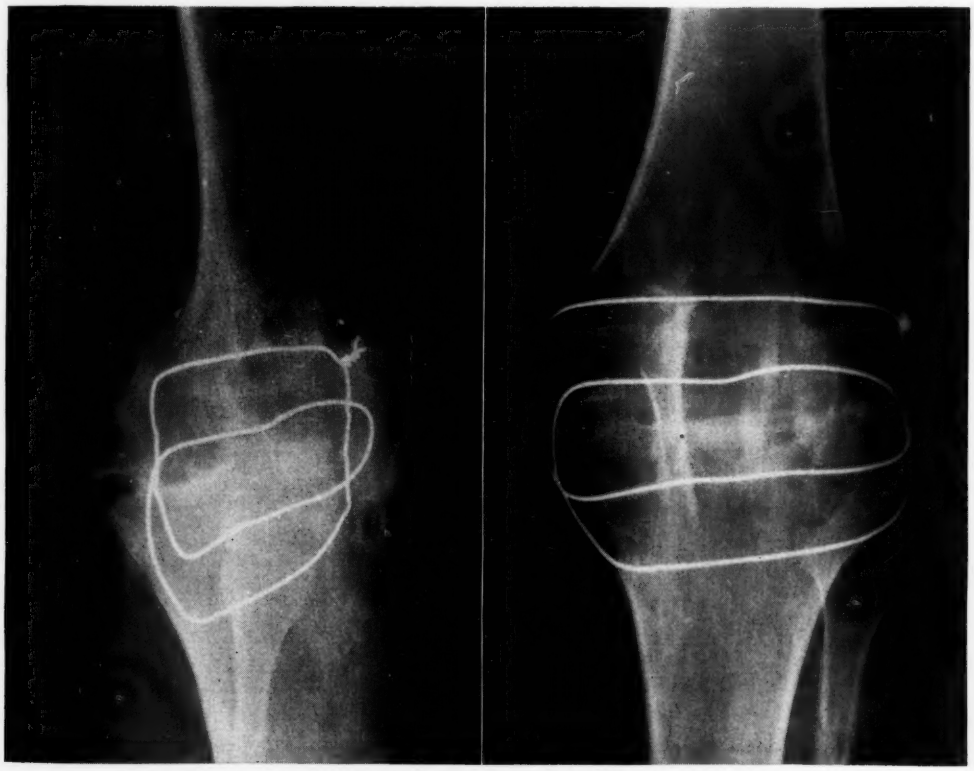


Fig. 2.—Arthrodesis obtained with the double loop stainless steel wire.

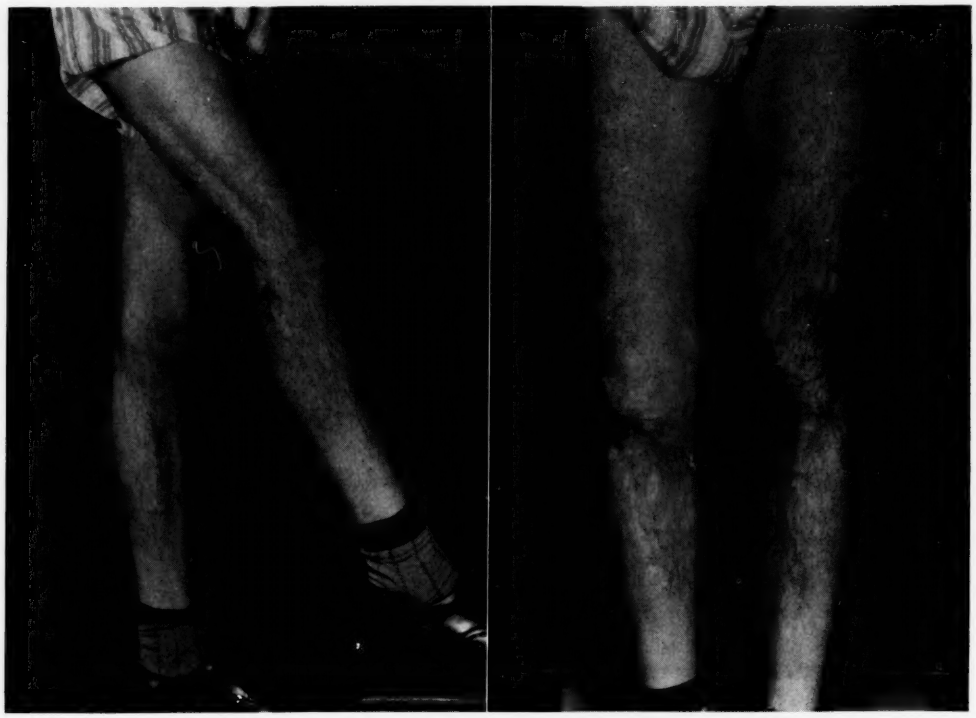


Fig. 3.—Functional results.

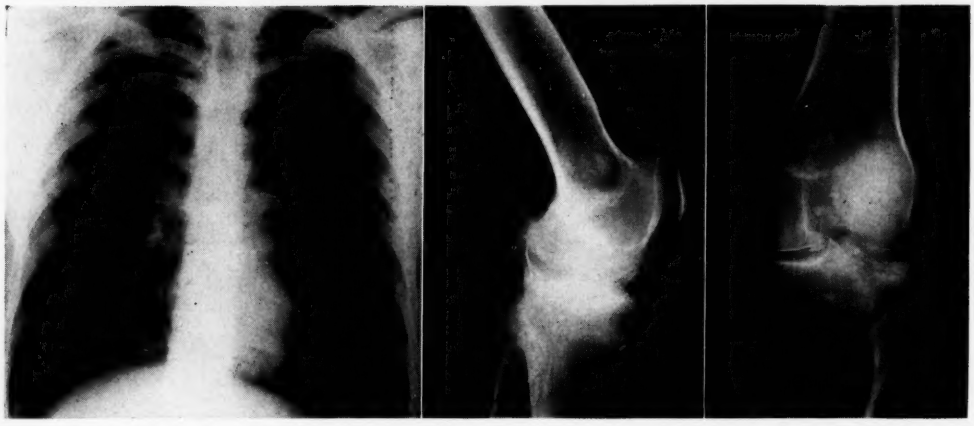


Fig. 4. — *A*, roentgenogram of chest. Thoracic conditions were unremarkable throughout. *B*, preoperative roentgenogram of knee.

foci of monocytes and giant cells in the synovia. There were no acid-fast rods. The pathologic diagnosis was granulomatous synovitis compatible with either tuberculosis or

syphilis. All cultures, smears and guinea pig inoculations gave negative results for tuberculosis.

The patient had an uneventful postoperative course. In August 1947, three and one-half months after the arthrodesis, he returned to work as a seaman. Repeated examinations revealed a good solid fusion. He has had no complaints or trouble referable to the knee, the ankle, the hip or the lower part of the back. The present appearance of the affected extremity may be seen in Figures 2, 3 and 4, which were taken on his last visit to this hospital in the fall of 1949.

SUMMARY

The authors have presented a method of compression fixation arthrodesis of the knee by the use of a double loop of No. 22 stainless steel wire with bone struts. A case illustrating this procedure is presented.

RÉSUMÉ

Les auteurs présentent un procédé de fixation avec compression d'arthrodèse du genou au moyen d'un double cercle avec du fil d'acier inoxydable no 22 et l'adjonction d'os. On présente le cas à l'appui.

RESUMEN

Se presenta un método de artrodesis de la rodilla con una asa doble de alambre de acero inoxidable número 22. Se ilustra con un caso.

SUMÁRIO

Os autôres apresentaram um metódo de artrodése de compressão e fixacão do joêlho com o uso de um duplo laco de fio de aco inoscidavel com expéques de osso. Um caso ilusbrativo deste processo e'apresentado.

ZUSAMMENFASSUNG

Die Verfasser beschreiben eine Methode der Kniegelenksversteifung durch Kompression und Fixierung mit Hilfe einer doppelten Drahtschlinge [No. 22] aus rostfreiem Stahl und von Knochenverstrebungen. Ein erlaeuternder Fall wird vorgestellt.

RIASSUNTO

L'AA. presentano un metodo di artrosi del ginocchio a fissazione compressa per uso di doppio nastro di filo metallico non corrosivo con scheggie di ossa. Un caso dimostrando questo procedimento e' offerto.

REFERENCES

1. Key, J. A.: Positive Pressure in Arthrodesis for Tuberculosis of the Knee Joint, South. Med. J. 25; 909-914, 1932.

2. Ghormley, J. C.: Positive Pressure in Arthrodesis of the Knee Joint, J. Bone & Joint Surg., **30B**:478-486, 1948.

3. Eggen, G. W. N.; Shindler, T. N. and Pomerat, C. M.: The Influence of the Contact Compression Factor on Osteogenesis in Surgical Fractures, J. Bone & Joint Surg., **31A**:693-715, 1949.

4. Bosworth, David M.: Knee Fusion on the Use of a Three Flanged Nail, J. Bone & Joint Surg., 28:550.

Let the despairing race of men know that there is no sign of decay, but universal uninterrupted vigor. All waste and ruin has a speedy period.

—*Thoreau*

Estradiol Implants in Postoperative Pituitary Exophthalmos

M. V. OKIE, M.D., H. B. DENEE, M.D., AND WILLIAM DALEY, M.D.
BUFFALO, N. Y.

EXOPHTHALMOS may be due to exophthalmic goiter, xanthomatosis, pituitary dysfunction, contusion, retrobular aneurysm, cavernous sinus thrombosis or severe shock. Recognition of the type of exophthalmos is essential to its treatment. The exophthalmos of hyperthyroidism may be either thyrotoxic or thyrotropic in origin, but the origin of progressive proptosis of hypothyroidism can be only hypophysial.

Thyrotropic hormone from the anterior lobe of the pituitary gland has been used in the production of experimental exophthalmos is guinea pigs. This is produced more readily in thyroidectomized than in intact animals.[1]

Estrogens and androgens are well known to suppress effectively the gonadotropic function of the anterior pituitary lobe. Estrogens and androgens have been used similarly in attempts to suppress other anterior pituitary functions, including the adrenocortical and the thyrotropic. Production of thyrotropic hormone is low in persons with Graves' disease, increases after thyroidectomy and is greatly elevated in the presence of malignant exophthalmos.[2] These experimental facts and laboratory observations led several investigators to the use of androgens and estrogens in an attempt to suppress thyrotropic hormone production in treating exophthalmos of pituitary origin.[3] In view of our previous demonstration of the estrogenic efficacy of steroid implants for the menopause[4] and for prostatic carcinoma,[5] we decided to employ this form of estrogen therapy in a case of pituitary exophthalmos.

Submitted for publication March 15, 1951.

REPORT OF CASE

G. D., a white man aged 52, was admitted to Mercy Hospital on Jan. 7, 1950. He complained of severe midepigastric pain one hour after eating, with occasional gaseous eructations. Tarry stools had been noticed for ten days. Operation had been performed in 1935 for perforation of a gastric ulcer.

Physical Examination. — The results of physical examination were essentially negative except for a well healed abdominal scar. The blood pressure was 110 systolic and 70 diastolic.

Roentgen Examination.—There was a large gastric ulcer on the lesser curvature of the stomach at the juncture of the pars media and the gastric antrum. Marked gastritis was present, with duodenitis and jejunitis. The skull and the neck revealed no abnormality. The chest showed an increase in fibrotic elements of both lung fields. The left side of the diaphragm appeared slightly elevated and thickened, and the left costophrenic angle was partially obliterated. There was no evidence of any substernal filling lesion.

Laboratory Studies.—The stools and the urine were essentially normal. On January 8 a blood count showed 4,500,000 erythrocytes per cubic millimeter of blood, with 14 Gm. of hemoglobin; 17,900 leukocytes per cubic millimeter, with a differential count of 83 per cent polymorphonuclears, 11 per cent lymphocytes, 6 per cent monocytes and 1 per cent eosinophils. On January 9 the count ran as follows: erythrocytes, 4,420,000; hemoglobin, 13.5 Gm.; leukocytes, 15,000, with 85 per cent polymorphonuclears, 3 per cent basophils, 8 per cent lymphocytes, 3 per cent nonocytes and 3 per cent eosinophils.

On January 12 the value for serum protein was 7.72 Gm. per hundred cubic centimeters. On January 18 the value for blood chlorides was 468 mg.

Treatment and Course.—The patient was transferred to the surgical ward on January 14. He was given 500 cc. of whole blood on

January 16. On the following day a subtotal gastrectomy with posterior gastrojejunostomy was performed. Numerous dense adhesions were present, surrounding the entire stomach. During the operation 1,000 cc. of whole blood was given, followed by an additional 500 cc. in the evening of the same day. The same amount was given on January 18 and 19 respectively. The blood pressure in millimeters of mercury was 110 systolic and 70 diastolic.

A Wangensteen tube was inserted on the morning of the operation and kept in place by adhesive tape until the fourth postoperative day. The postoperative course was uneventful until January 25, when exophthalmos was noted.

On January 24 the value for hemoglobin was 16 Gm. There were 18,000 leukocytes per cubic millimeter of blood, with 76 per cent polymorphonuclears, 16 per cent lymphocytes, 3 per cent monocytes and 5 per cent eosinophils.

On January 27 the leukocyte count was 4,500, with 67 per cent polymorphonuclears, 19 per cent lymphocytes, 5 per cent monocytes, 7 per cent eosinophils and 2 per cent basophils. The blood pressure was 110 systolic and 70 diastolic.

On January 28 exophthalmos was very pronounced. The eosinophil count had increased to 9 per cent. Adrenal cortical extract was given. The value for blood chlorides was 490 mg. per hundred cubic centimeters. The basal metabolic rate was plus 1. An ophthalmologic consultation showed that characteristics of exophthalmos were present, and palliative measures were instituted.

On January 30 the exophthalmos was subsiding. The erythrocyte count was 4,600,000 and the value for hemoglobin 15 Gm. The leukocyte count was now 12,500, with 3 per cent eosinophils.

On February 3 the value for hemoglobin was 16 Gm. The leukocyte count was 12,500, with 2 per cent eosinophils.

By February 7 the wound had healed and the exophthalmos regressed. On February 10 all medication was discontinued and the patient discharged to the outpatient department. The exophthalmos had completely receded. The blood pressure was 110 systolic and 70 diastolic.

Pathologic Report.—The resected segment of stomach measured 11 cm. along the lesser curvature and 13.5 cm. along the greater curvature. A huge ulcer crater, 5 by 3 cm., was present on the lesser curvature. There was no evidence of malignancy. Palliative treatment of exophthalmos was given during hospitalization with Lugol's solution, 10 drops four times a day and phenobarbital, ½ grain, four times a day. Penicillin and zinc sulfate solution were applied to the eyes. Adrenal cortex extract, 5 cc. was given intramuscularly twice daily. The patient was encouraged to increase his salt intake to about 20 Gm. daily, in the proportion of 4 parts of sodium chloride to 1 part of potassium chloride.

On March 28 the patient was readmitted because of marked exophthalmos with lid lag. The lenses appeared opaque, and there were bubble-like lesions within the lens proper. The abdominal wound was well healed. There was no gastric discomfort. The patient tolerated all food. He was again given Lugol's solution, 15 drops four times a day. Phenobarbital, ¼ grain four times a day and adrenal cortical extract 5 cc. twice daily were administered. He was also given 1 gr. of thyroid twice a day. This therapeutic regimen was continued until April 7.

On April 3 two 25-mg. estradiol pellets* were implanted into the subcutaneous tissue over the anteromedial aspect of the right thigh.

On April 3 the lid lag measurements were 10/16″ for the right eye and 11/16″ for the left. The eosinophil count on March 31, April 3, April 4 and April 6 was 3 per cent, 7 per cent, 9 per cent and 1 per cent respectively.

On April 7 the adrenal cortical extract was discontinued, and on the following day the eosinophil count was 4 per cent.

On April 9 the exophthalmos showed 50 per cent recession. The patient was discharged to the outpatient department. The lid lag measurements on April 10 were 7/16″ for the left eye and 8/16″ for the right; on April 20, 6/16″ for the left eye and 7/16″ for the right, and on May 8, 6/16″ for the left eye and 7/16″ for the right.

Recession of the exophthalmos was more dramatic. The eosinophil count subsequently varied between 2 per cent and 4 per cent. No allergic phenomena could be detected at any time. The urinary output of 17-ketosteroids was 3.9 mg. per twenty-four hours, considerably below the normal 12 to 15 mg.

Constant elevation of the eosinophil count together with the low urinary output of 17-

*Supplied by Schering Corporation as Progynon Pellets through the courtesy of Dr. W. H. Stoner.

ketosteroids, was interpreted to indicate adrenal failure or hypofunction of the adrenal cortex. Desoxycorticosterone,* 5 mg. every three to four days, was given intramuscularly. The eosinophil count became normal and has remained so to the time of writing.

SUMMARY

A case is presented in which exophthalmos following abdominal surgical intervention was treated effectively by depression of anterior pituitary production of thyrotropic hormone with implantation of estradiol pellets.

RÉSUMÉ

On rapporte un cas d'exophtalmie consécutive à une intervention chirurgicale abdominale. Cette affection fut traitée avec succès par la réduction des hormones thyrotropiques du lobe antérieur hypophysaire consécutif à l'implantation de "pellets" d'estradiol.

ZUSAMMENFASSUNG

Es wird ein Fall von im Anschluss an eine Bauchoperation aufgetretenem Exophthalmus beschrieben, der durch Herabsetzung der Produktion des thyreotropen Hormons des Hypophysenvorderlappens erfolgreich mittels Einpflanzung von Estradiolkuegelchen behandelt wurde.

SUMÁRIO

Um caso e'apresentado no qual a exoftalmia que se apresentou em seguida a'uma intervencão cirurgica abdominal foi bratada com sucesso pelo frenamento da producão do harminio tirestró pico do lo'bo pituitario anterior, com implantacão de graõs de estradiol.

*Supplied by Schering Corporation as Cortate through the courtesy of Dr. W. H. Stoner.

RIASSUNTO

Presenta un caso nella quale esoftalmo seguente chirurgia addominale fu trattato effettivamente per depressione del prodotto pituitario del ormone tirotropico coll'impiantamento di pallette di estradiol.

RESUMEN

Se presenta un caso de exoftalmía consecutiva a intervención quirúrgica abdominal, tratado efectivamente reduciendo la producción anterohipofisiaria de hormona tirotrópica con la implantación de comprimidos de estradiol.

REFERENCES

1. Dobyns, B. M.: Studies on Exophthalmos Produced by Thyrotropic Hormone: I. A Study of Exophthalmos Produced by Various Thyrotropic Hormones and the Influence of the Testes on the Exophthalmos, Surg., Gynec. & Obst. 82: 290, 1946; II. Changes Induced in Various Tissues and Organs (Including the Orbit) by Thyrotropic Hormone and Their Relationship to Exophthalmos, Surg., Gynec. & Obst. 82:609, 1946; III. Further Study of Changes Induced in Fat by Thyrotropic Hormone (Tissue Reaction) Associated with Exophthalmos, Surg., Gynec. & Obst. 82:717, 1946. A Study of Exophthalmos and Tissue Changes Resulting from the Administration of Various Thyrotropic Hormone Preparations. Thesis, University of Minnesota, 1946. Thyrotropic Hormone in Exophthalmos, Harvard University Press, to be published.
2. Purves, H. D., and Griesbach, W. E.: Thyrotropic Hormone in Thyrotoxicosis, Malignant Exophthalmos and Myxedema, Brit. J. Exper. Path. 30:23, 1949.
3. Klotz, H. P.: Regression of Malignant Edematous Exophthalmos by Estrogens and Irradiation of Pituitary, Ann. d'endocrinol. 9:184, 1948. Paschkis, K. E., and Cantarow, A.: Hyperophthalmopathic Syndrome in Thyroid Disease, J. Clin. Endocrinol. 7:102, 1947. Vilanova, X., and Cañadell, J. M.: Myxedema Circumscriptum Thyrotoxicum, 9:883, 1949.
4. Okie, M. V.: Treatment of Menopause by Estradiol Pellet Implantation, New York State J. Med. 49:1175, 1949.
5. Okie, M. V.; Carden, M. L.; McGee, H. J., and Tracy, E. M. Jr.: Estradiol Pellet Implantation in Carcinoma of the Prostate, New York State J. Med. 51:637-640, 1951.

Surgical Aspects of Meckel's Diverticulum

A. B. McGRAW, M.D., F.A.C.S.
DETROIT

FAILURE of complete closure of the omphalomesenteric duct during withdrawal of the extracelomic gut into the abdominal cavity of the fetus during the eighth week of gestation gives rise to the diverticulum associated with the name of Johann Friedrich Meckel the Younger (1781-1833), of Halle, Germany. He was the youngest of three generations of eminent scientists, each of whom made significant contributions in the fields of anatomy and embryology. He was also the first to describe the embryologic development and the histologic and pathologic character of this congenital anomaly. Its existence, however, had been noted and recorded several times in the medical literature of the previous three hundred years, first by Hildanus in 1598 and later by Lavater in 1671, by Ruish in 1707, by Littré in 1742 and by Morgagni in 1769.

Reports of various large series of autopsies indicate that this anomaly occurs in about 2 per cent of human beings, the male predominating in the ratio of 2:1. At our clinic 48 Meckel's diverticula were observed in 4,200 consecutive autopsies.

The fairly frequent harboring of such a diverticulum harmlessly throughout life tends to create a feeling that it is little more than an anatomic curiosity. There is too little general realization of the seriousness and sometimes the urgency of certain acute abdominal conditions in which these diverticula play the causal role. Even the chance finding of such a diverticulum during laparotomy for another condition sometimes leads to no more than its mention in the operative note. I regret to say that in our series of 28 chance encounters, 4 of these diverticula were left untouched.

Read at the Fifteenth Annual Assembly of the United States Chapter, International College of Surgeons, Cleveland, Nov. 1, 1950.
Submitted for publication Feb. 14, 1951.

During the same period an equal number of cases (28) were encountered in which a Meckel's diverticulum was found to be the cause either of an acute abdominal emergency (in 20) or of a series of subacute episodes (in 8). It is with these 28 cases and certain instructive points gained from their study that this paper is chiefly concerned.

A Meckel's diverticulum may be the cause of a serious abdominal condition by (1) its involvement in an acute inflammatory process, (2) its participation in an acute intestinal obstruction and (3) as a result of bleeding and/or perforation of a peptic ulcer within its lumen. Accurate diagnosis of an acute inflammatory flare-up is frequently missed. All the symptoms and signs of acute appendicitis are exactly simulated, and this much more likely yet mistaken diagnosis was made 5 times in this series. No harm came to any of the patients, because the inadequacy of the appendix to explain the symptoms was recognized and the diverticulum sought for and removed. Neglect of such search could well have led to catastrophe. In this connection, accurate observations of the location of the diverticulum in the ileum made in this series of cases may be of importance. Our experience indicates that only 4 per cent of such diverticula lie within the terminal 6 inches (15.2 cm.) of the ileum. Twenty-eight per cent lie within the terminal 18 inches (45.7 cm.) and 72 per cent within the terminal 36 inches (91.4 cm.). That leaves 28 per cent, or more than 1 out of 4 diverticula, lying more than 3 feet above the ileocecal junction. As one in our series lay 66 inches (1 m., 67 cm.) above the ileocecal valve, we urge that at least the terminal 6 feet of the ileum be inspected in searching for a Meckel's diverticulum.

There are so many causes of small bowel obstruction that only failure to in-

clude thought of a participating Meckel's diverticulum in the differential diagnosis can be criticized. The participation of this lesion should particularly be thought of as the cause of a suspected intussusception, and, if an intussusception is reduced by the method of Ravitch, careful subsequent roentgen search for the diverticulum should be made. The roentgen diagnosis is difficult to make, and the demonstration of a persistent segment of barium lying at an angle with the rest of the ileum requires many serial roentgenograms of the small bowel, taken as often as ten minutes apart. When found at operation to be the cause of an intussusception, the diverticulum should be removed then and there if the patient's condition permits; otherwise, by a later operation.

The history of 1 case in the present series is illustrative. The patient, a boy, first underwent a surgical procedure at the age of 14 months for supposed appendicitis. At that time the appendix was removed and an ileocecal intussusception of 10 inches (25.4 cm.) of the ileum was reduced. The boy continued to have episodes of abdominal pain with vomiting. At the age of 5 years he was again admitted to the hospital with bright bloody stools, a mass in the right lower abdominal quadrant, nausea and vomiting. The preoperative diagnosis of intussusception with Meckel's diverticulum was confirmed at operation, and the intussuceptum was found to extend to the hepatic flexure. Because of the child's poor condition the surgeon elected to forego resection, as the bowel appeared to be viable, and he sutured the cecum and the lower portion of the ileum to the lower abdominal wall. Six months later the child was readmitted with another intussusception, which was led by the diverticulum. Resection of 10 cm. of the ileum was done, and the child has since been symptom-free.

Three other ways in which a Meckel's diverticulum may participate in obstruction of the small bowel are by incarceration in a hernia sac, by congenital attachment to the umbilicus, either directly or by a persisting fibrous band, and by inflammatory adhesions to the abdominal wall or to another segment of bowel. Each condition was encountered at least once in this series.

The most serious condition associated with Meckel's diverticulum is massive bleeding. It has long been known that part or all of the mucous membrane of such a diverticulum may consist of heterotopic gastric or duodenal mucosa. Peptic ulceration of such heterotopic mucosa with consequent bleeding may occur in early infancy and is prone to occur at some time before adolescence. It is the commonest source of massive bleeding in infants and young children, and failure to suspect this diagnosis and to act promptly on suspicion cannot be excused. This diagnosis was made and our suspicions confirmed in 8 of our 20 cases of acute involvement. Bleeding is poorly tolerated by infants and young children, especially a second hemorrhage following close on the heels of the initial episode. It is therefore important not only to make the diagnosis but to resort promptly to surgical intervention and not try expectant or conservative treatment. Unlike the bleeding of a duodenal ulcer, which is difficult to control, bleeding from a Meckel's diverticulum is quickly and easily controlled by excision or resection of the offending anomaly. The condition of our youngest patient with hemorrhage was diagnosed from massive bleeding at the age of three months. Conservative treatment nearly proved fatal, owing to a second hemorrhage one month later. At operation a very long diverticulum was found, bleeding from an ulcer close by its juncture with the normal bowel. On account of the infant's feeble condition, all that was done was rapid excision of the ulcer-bearing segment and exteriorization of the two ends of ileum and the opened base of the diverticulum. On the fourteenth postoperative day the baby's condition permitted resection of the long (28 cm.) diverticulum, together with the bowel to which it was adherent.

In 2 cases of bleeding the patients had had appendectomies elsewhere without further search. One, a boy aged 12, continued to have pain and sometimes tarry stools for a year after appendectomy and was admitted with a hemoglobin value of 8.6 Gm. per hundred cubic centimeters. Operation after transfusion revealed a short diverticulum with both bleeding and perforation of an ulcer at its tip. The other patient, a girl, also 12 years old, had had bleeding and abdominal discomfort off and on since the age of 4 and had had an appendectomy two years before we saw her. She, too, had a peptic ulcer in the tip of a long diverticulum. Both patients were relieved by resection and anastomosis.

With regard to the surgical treatment of these diverticula, I am strongly in favor of either excising the diverticulum at its base or resecting the segment of ileum containing the diverticulum. In the entire series of 55 operative cases, excision was done in 36 and resection in 14. Simple excision is adequate and satisfactory when there is no inflammatory reaction involving the base of the diverticulum and the adjacent bowel wall. Placing the line of excision obliquely across the base of the diverticulum, according to the method suggested by Ladd, is of great practical importance. When excision is not possible, resection of the involved section of ileum, together with the diverticulum, is the method of choice. The continuity of the bowel may be reestablished equally well by end-to-end or side-to-side anastomosis. I do not favor simple inversion of these diverticula, however small they may be, on account of the possibility of atypical mucosal and peptic ulceration; and for the same reason I am very much opposed to leaving them in situ.

Although peptic ulcer in a Meckel's diverticulum is the most frequent cause of severe intestinal bleeding in infants and young children, there are a number of other nonsurgical causes that should be thought of in differential diagnosis and if possible ruled out by hematologic and other studies. These other conditions are hemophilia, purpura hemorrhagica, intestinal polyps, intestinal hemangiomas and Henoch-Schönlein's disease. I do not, however, consider it wise to attempt roentgen proof of the presence of a Meckel's diverticulum when severe recent bleeding has occurred.

SUMMARY

The author outlines the three most important surgical complications associated with Meckel's diverticulum, the acute inflammatory, the acute obstructive and the hemorrhagic. Of these, the hemorrhagic cases are no less urgently in need of prompt treatment than are the other two groups. They are moreover the very cases in which a correct presumptive diagnosis can most dependably be made if one understands the underlying pathologic condition and is alerted by unmistakable symptoms and signs. Evidence is submitted that 1 of every 4 such diverticula may lie much farther from the ileocecal junction than is generally believed. It is urged that such diverticula be completely excised or resected rather than inverted or left alone, whether they are encountered by chance or as the cause of an acute abdominal emergency.

ZUSAMMENFASSUNG

Der Verfasser beschreibt die drei wichtigsten chirurgischen Komplikationen des Meckelschen Divertikels, naemlich die akute Entzuendung, den akuten Verschluss und die Blutung. Die blutenden Faelle beduerfen einer sofortigen Behandlung genau so dringend wie die Kranken der anderen beiden Gruppen. Ja, gerade diese Faelle sind es, in denen eine richtige Wahrscheinlichkeitsdiagnose mit grosser Zuverlaessigkeit gestellt werden kann, wenn die zugrunde liegenden pathologischen Veraenderungen richtig verstanden werden und unverkennbare Symptome und Krankheitszeichen nicht der Aufmerksamkeit entgehen. Wir haben den Beweis erbracht, dass unter je vier

Faellen sich einer befindet, in dem das Divertikel viel weiter von der Ileocoekalklappe entfernt liegt als allgemein angenommen wird. Wir haben angeregt, solche Divertikel, gleichgueltig ob sie zufaellig oder als Ursache eines akuten Bauchfalles zur Beobachtung kommen, vollstaendig zu resezieren, anstatt sie einzustuelpen oder unbehandelt zu lassen.

RESUMEN

El autor señala las tres más importantes complicaciones quirúrgicas asociadas con el divertículo de Meckel: la inflamatoria aguida, la obstructiva aguda y la hemorrágica. De estas, los casos hemorrágicos necesitan menos urgentemente del tratamiento pronto que los de los otros dos grupos. Son a mayor abundamiento los verdaderos casos en que un diagnóstico de presunción correcto puede depender mucho del conocimiento del estado patológico existente, advertido uno de síntomas y signos inequívocos. Se manifiesta la evidencia de que de cada cuatro divertículos uno puede estar mucho más distante de la unión ileocecal de lo que generalmente se cree. Se señala la urgencia de que tales divertículos deben ser completamente extirpados o resecados más bien que invertidos o abandonados, en caso de encontrarse por casualidad o debido a una emergencia abdominal aguda.

RIASSUNTO

L'A. delinea le tre piu importanti complicazioni chirurgiche associato col diverticolo di Meckel l'infiammatorio acuto, l'ostruttivo acuto e emorragico. Di questi, i casi emorragichi non sono meno urgente di trattamento che sono i due altri gruppi. Sono altronde i veri casi in cui una corretta diagnosi presentiva si puo' fare con fiducia se uno comprende la condizione patologica sostenuto e stante all'erta a sintomi e segni non suscettibile di sbaglio. Abbiamo sommesso prova che uno di ogni quattro pari diverticoli puo' stendersi piu lontano dalla congiunzione ileocecale che e' generalmente creduto. Abbiamo richiesto estirpazione e risezione completa di tale diverticoli piutosto dell'inversione o l'abbandonamento, siano riscontrati per caso o a ragione d'un avvenimento acuto addominale.

SUMÁRIO

O autor descreve as tres mais importantes complicações cirúrgicas associadas ao diverticulo de Meckel:—a complicação inflamatória aguda, a c. aguda obstrutiva e a hemorragica. Os pacientes com complicações hemorragicas necessitam tanto de tratamento quanto os pertencentes aos dois restantes grupos. Eles representam, realmente, os muitos casos nos quais o diagnóstico provavel póde ser feito si a primitiva condição patologica fôr tomada em conta, como tambem si os sintomas e signais patognomônicos forem observados a tempo. O autor tenta estabelecer que 1 de cada 4 entre tais diverticulos póde ser da união ileo-coecal, aó contrario do que geralmente se supõe. A completa excisão on ressecção de tais diverticulos se impõe preferivelmente a invertêl-os ou deixal-os quando são incidentalmente encontrados ou quando constituem a causa de um abdomen agudo cirúrgico.

RÉSUMÉ

L'auteur rapporte ici les trois plus graves complications du diverticule de Meckel, à savoir l'inflammation aigue, l'occlusion aigue et l'hémorragie. L'hémorragie doit être traitée aussi rapidement que les deux autres. Il existe cependant certains cas où, plus qu'une présomption, même un diagnostic certain est fait en se basant sur des symptômes précis et en comprenant très bien la pathogénie de la lésion. L'auteur a démontré de toute évidence que dans la proportion d'un sur quatre, le diverticule est plus éloigné de la jonction iléo-coécale qu'on ne le croit habituellement. L'auteur insiste qu'une résection complète avec extirpation soit faite du diverticule plutôt que de l'inverser et le laisser en place, soit qu'on le trouve par hasard ou durant une crise aigue de l'abdomen.

Gallstones in Stomach Wall with Symptoms of Pyloric Stenosis

Report of a Case

HALIT ZIYA KONURALP, M.D., F.I.C.S.
ISTANBUL, TURKEY

IT IS not uncommon for gallstones to pass through a fistula that has been formed between the gallbladder bile ducts and some other organ. Such fistulas are formed by ulceration and necrosis due to inflammation and pressure at the site of the gallstones. The gallbladder is the organ most often involved and the most common site is the fundus.

Quite a few reports on this subject are to be found in the literature. Gallstones have been discovered in the bronchi, in the pleural cavity, in the renal pelvis, in the urinary bladder, in the gravid uterus and even in ovarian cysts. Their most common migration, however is to the duodenum or the large intestine. Occasionally they may reach the stomach.

These migrating stones are usually found in the lumen (very rarely in the walls) of the organs into which they have moved. Thus far only two cases have been reported, one by Makkas (*Zentralbl. f. Chir.* May 20, 1930) and one by W. Siemens *Zentralbl. f. Chir.*, 59:267-270, Jan. 30, 1932). Both of these authors found gallstones in the walls of the duodenum.

It is not uncommon to find the gallbladder opening into the stomach and allowing gallstones to pass into this organ. In many cases the migration takes place asymptomatically. For this reason the case here reported is especially interesting, as the gallstones were located in the walls of the stomach, not in the lumen, and gave rise to clinical signs and symptoms of pyloric stenosis.

From the Surgical Clinic, University of Istanbul School of Medicine, Istanbul, Turkey.
Submitted for publication Nov. 14, 1948.

REPORT OF CASE

History.—The patient, a 26-year-old housewife with one child, was sent to me by a physician because of continuous vomiting, loss of weight and no response to medical treatment. She was hospitalized on Jan. 1, 1947. Her complaints had begun three years previously, with nausea, vomiting and pain in the epigastric region extending to the back. Pain was most severe after meals especially if fat fried food or eggs were eaten, but some-

Fig. 1.—Roentgenogram taken after barium meal, showing bowl-shaped stomach with great dilatation.

Fig. 2.—Roentgenogram taken six hours later, showing remainder of barium meal in stomach.

times it appeared without relation to meals. During this period the temperature was not elevated but the patient was slightly jaundiced. Her attacks of pain would usually last for three or four days then recede, and after a lapse of a few days occur again. At the beginning the vomitus was composed of wash food and bile.

The early episode had been treated by a three month period of medication and diet. The patient improved and was in good condition for two years. Nine months before she consulted me the nausea and vomiting recurred. Diet and repetition of the previous medication brought about no improvement, and during the last months of this period vomiting was almost continuous, the vomitus containing particles of food eaten two days before. During the entire three year period the patient noticed no blood in the vomitus or in the stools. During the last few months before operation, the patient was too weak to stand. She was constipated and the urine was scanty.

The history included an attack of malaria in addition to the present illness.

Clinical Examination. — The patient appeared weak, emaciated and dehydrated but otherwise normal. She weighed 32 Kg. and was somewhat pale and anemic. The conjunctivae were subicteric. There was no subcutaneous fat tissue. The temperature was normal and the arterial blood pressure was 110 systolic and 80 dyastolic. The tongue was dry and coated. The lower margin of the stomach was two finger breadths above the sumphysis pubis. Traube's space was very wide. The pyloric region was sensitive and painful on pressure. The liver and the spleen were not palpable.

Laboratory Tests. — Examination of the urine revealed no abnormality. The bleeding time was 4.5 minutes; the coagulation time, eight minutes. The erythrocyte count was 3,000,000; the leukocyte count, 6,500, and the thrombocyte count, 280,000. The hemoglobin value was 56 per cent. The Wassermann test gave negative results. On abdominal examination a positive Kussmaul sign was observed, and below the level of the umbilicus clupotage was obvious.

Roentgen Examination. — The roentgenograms showed an atomic stomach occupying the larger portion of the abdomen, its lower margin reaching the pubis. The pyloric canal and the bulbus could not be seen. The stomach seemed to contain an abnormal amount of mucous and three are no plica. After six hours no change had been noted, and even with pressure the barium did not pass through the pyloris. The diagnosis was pyloric stenosis.

Operation.—After the usual preparation the patient was operated on (March 7, 1947). Local and paravertebral anesthesia (novocaine

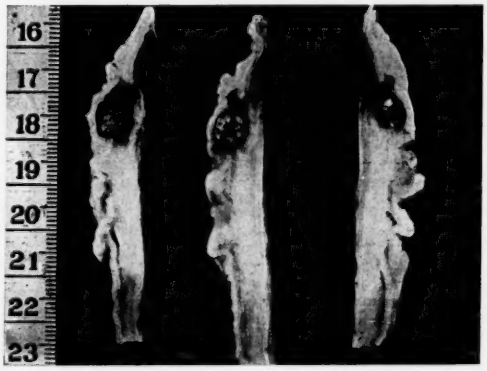


Fig. 3.—Macroscopic view of gallstones in wall of prepyloric region.

0.5 per cent) was used. The abdomen was opened in the midline above the umbilicus, revealing a severely dilated stomach. On the anterior surface of the pyloris white scar tissue (superficial) was observed. The fundus of the gallbladder was thickened and contained five gallstones. By means of the scalpel, it was separated from the stomach rather easily, neither the stomach nor the gallbladder being opened. A cholecystectomy was performed in anterograde fashion. Because of the superficial scar tissue in the pyloric region and the lesion due to adherence of the gallbladder to the prepyloric region, two-thirds of the stomach was resected, and a retrocolic and isoperistaltic (oralis inferior) anastomosis of the Finsterer type was carried out. A drainage tube was left in the bed of the gallbladder, and the abdomen was closed in three layers.

The postoperative course was uneventful. The skin sutures were removed on the eighth day, and by gradual shortening the drainage tube was removed on the 10th. Because of general weakness the patient was given a special diet and a medical regime and was discharged on Sept. 17, 1947, in good condition. Her weight was 47 Kg., which represented a gain of 15 Kg. since the operation.

Anatomopathologic Picture.—The gallbladder contained five gallstones. Its walls were thickened, showing scars in several areas and evidences of chronic inflammation. In the region of the fundus was an especially thick scar with fibrous infiltration.

A portion of the stomach 6 by 15 cm. was examined. In the pyloric region the walls were greatly thickened. A section from this area revealed three pea-sized yellow stones, mulberry-like in formation. These were easily removed from their sites in the gastric wall, and an opening was left in their place.

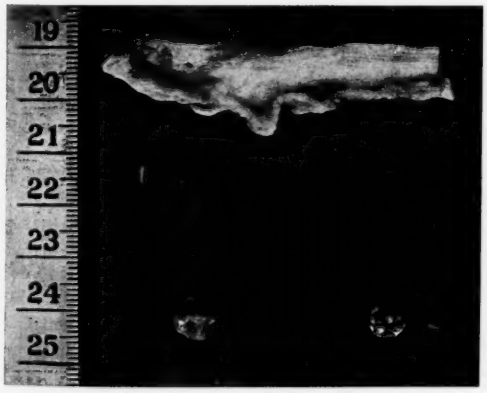


Fig. 4.—Hypertrophic stomach wall and gallstones, showing proportionate size.

Fig. 5.—Low power photomicrograph showing gallstone lodged in stomach wall.

Chemical Analysis of Stones.—The stones on analysis contained cholesterin, 80 per cent; bilirubin, 8.5 per cent; calcium salts, 1.5 per cent, and water, 10 per cent.

Histologic Examination of Gastric Wall.—The submucosa revealed small cavities. In some areas these were covered with mucosa-like epithelium; in others with granulation tissue rich in plasmocytes, lymphocytes and capillaries. These openings extended as far as the epithelium of the mucosa and were located between the muscular layer and the mucosa of the stomach.

COMMENT

The characteristics of the case presented are:

Fig. 6.—Higher power microscopic view of area shown in Figure 5. The muscle fibers are conspicuous.

1. The gallstones were lodged discretely, like diamonds, in the wall of the stomach.

2. The fistula that permitted migration of these stones from the gallbladder to the stomach wall had completely disappeared.

3. The gallstones, being located in the pyloric region, caused symptoms of pyloric stenosis, and the result of the stenosis could be seen.

The two cases recorded in the literature are somewhat similar. In the case reported by Makkas in 1930, the gallstones were located in the duodenal submucosa in a ringlike manner closing the duodenal lumen. Makkas was unable to trace any of the fistula. His case was the first of its kind to be reported.

W. Siemens, 1932, reported a similar case. Finding a gallstone in the duodenum, he could not trace any communicating passage between that organ and the gallbladder or its principal biliary passages.

In these two cases the gallstones were seen in the duodenal wall, which indicates that bile at some time entered the duodenum through a biliary passage. This however is quite common. In my own case, on the other hand, the gallstones were found in the prepyloric region of the stomach. The mucosa of the region was intact, and the stones were lodged in isolated cavities partially covered with epithelium. Their connection with the gallbladder had completely disappeared, and no sign of the fistula was found. It is my opinion that during the cholecystic episode the fundal portion of the gallbladder adhered to the stomach and that a fistula was formed as a result of inflammation and necrosis. Three of the gallstones then moved into the gastric wall as far as the submucosa. Later, when the inflammation subsided, the fistula closed spontaneously and completely, only a superficial adherence between the bladder and stomach being left.

SUMMARY

A case is reported in which migratory gallstones were found embedded discretely in the walls of the stomach, producing classic symptoms of pyloric stenosis. The case is unusual in that the stones occupied the gastric walls rather than the lumen of the stomach. Operation was performed with entirely successful results.

RÉSUMÉ

Un cas est rapporté de calculs biliaires qui migrèrent et se logèrent discrètement dans la paroi estomacale produisant les symptômes classiques de nature pylorique. Le cas est rare que les calculs se logent dans la paroi gastrique plutôt que dans la lumière de l'estomac. L'opération donna des résultats satisfaisants.

ZUSAMMENFASSUNG

Es wird ein Fall beschrieben, in dem

wandernde Gallensteine beobachtet wurden, die sich deutlich in den Magenwaenden eingebettet hatten und das klassische Bild einer Pylorusstenose hervorriefen. Der Fall ist insofern ungewoehnlich, als die Steine sich in der Magenwand selbst und nicht in der Hoehle des Organs befanden. Es wurde eine Operation mit vollem Erfolg ausgefuehrt.

SUMÁRIO

Um caso de cálculos biliares migratórios encastoados discretamente nas parêdes do estômago é relatado, no qual se observaram os classicos sintomas de estenóse pilórica. Mais digno de menção foi o fáto de que as pedras ocupavam as parêdes do estômago em vez de se encontrarem na luz do estômago.

A intervenção cirúrgica foi executada com resultado inteiramente satisfatório.

RIASSUNTO

Descrive un caso in quale calcoli biliari emigranti furono osservati incastrati discretamente nella muraglia dello stomaco producendo sintomi classici delpiloro stenosato. Il caso e' straordinario cio' che i calcoli occupavano i muri gastrici piuttosto che il cavo dello stomaco. L'operazione diede risultati con successo.

Copies of the Revised Constitution and Bylaws
Are Now Ready for Distribution

All who are interested in membership qualifications should write to the

Secretary, International College of Surgeons

1516 Lake Shore Drive Chicago, Ill.

Perforation of the Gallbladder

JOSEPH P. CANGELOSI, M.D., A.I.C.S., ANGELO L. VINCENTI, M.D., A.I.C.S., AND EDWARD KALVELAGE, M.D., F.I.C.S.
CHICAGO

THE incidence of acute perforation of the gallbladder is higher than has generally been believed, being often unrecognized and undiagnosed until necropsy. Johnstone and Ostendorph[1] reviewed 12,000 consecutive autopsies and noted 32 instances of perforation of the gallbladder as a cause of death—a ratio of 1 to 375. Cowley and Harkins[2] reported an average incidence of 13 per cent in a collected series of 2,261 cases of acute cholecystitis. Others[3] have shown that perforation occurs in 13.4 to 22 per cent of cases unless immediate surgical measures are employed.

Sanders[4] found that the incidence of perforations is higher in men than in women. Although others have substantiated his observations, no explanation has been offered for this peculiar circumstance.

The majority of perforations are associated with stones and a history of long-standing disease of the gallbladder. In Sanders' series[4] perforation of the gallbladder due to calculi was observed in 42 of 46 cases (91 per cent). McGuigan[5] made a study of 82 cases of perforated gallbladder and found calculi in two-thirds of the patients. However, a search for stones was omitted in some cases owing to the condition of the patient.

The mortality rate for acute perforation has varied from 22.7 per cent[6] to 45 per cent.[7] Gosset and his associates[8] analyzed the cases of 111 patients with perforation of the gallbladder into the peritoneal cavity, all operatively treated, with a mortality of over 52 per cent. The mortality rate varies according to the time that elapses after perforation and before surgical intervention.[9]

Perforation of the gallbladder is graver than perforation of a gastric or duodenal ulcer, because the clinical picture is less well known and less often diagnosed. Statistics from other writers show that perforation is far commoner after than before the fifth decade of life. Mailer's[10] explanation — that the gallbladders of older persons are less distensible and less vascular because of varying degrees of arteriosclerosis—seems plausible. This, in his opinion, encourages circulatory disturbances and gangrene. We have shown[11] that intestinal obstruction due to gallstone is a surgical emergency. Blain and Harkins[12] noted that intestinal obstruction was present in about 25 per cent of cases of gallbladder perforations.

Perforation of the gallbladder does not present the dramatic picture associated with other causes of visceral leakage; hence the treacherous and unyielding onset of general peritonitis is easily overlooked and accounts for a very high mortality.

It is generally conceded that early operation is indicated in all cases of acute cholecystitis. The correction of physiologic disorders before any surgical procedure is contemplated is very important. This has been outlined aptly by Walters and Snell.[13]

The following case is reported because it presents a differential diagnostic problem in an elderly patient with right hemiplegia.

REPORT OF CASE

Mr. F.C., an Italian-born white man aged 68, weighing 180 pounds (81.6 Kg.), was admitted to St. Elizabeth hospital on Sept. 6, 1948.

For three days prior to admittance he had complained of slight epigastric discomfort with eructation. An enema and sodium bicarbonate afforded no relief. On admission to the hospital his temperature was 101 F.; the pulse rate was 88 and the respiratory rate 24.

From the Surgical Service, St. Elizabeth Hospital, Chicago, Ill.
Submitted for publication March 30, 1949.

There were severe chills and marked abdominal pain.

The family history was inconsequential, and the medical and surgical history was essentially noncontributory. However, in 1943 the patient suffered a "stroke", since which right-sided paralysis had produced a semi-invalid state. There was partial aphasia, with incoherence of speech. Further information obtained from the family produced no history of abdominal distress or food dyscrasia. The patient drank coffee moderately, enjoyed all foods and slept well.

Physical examination revealed him to be well developed but acutely ill. The skin was normal in color, though somewhat clammy, and the face was flushed. The temperature was 101 F., the pulse rate 100 and the respiratory rate 28. The pupils were equal and reacted to light and accommodation. Neither the sclere nor the conjunctivae were injected or jaundiced. The ears, nose and throat were essentially normal. The right half of the mouth drooped. The tongue, when protruded, deviated to the right side.

The chest presented fine moist rales in both lower lung bases. There were diminished lung excursions but no apparent dullness was noted. Respirations were somewhat rapid and slightly labored.

The cardiac borders were exaggerated to the right and left, with the apex beat in the fifth interspace. There was a hard, somewhat harsh blowing systolic murmur, elicited best at the apex. The rhythm was regular. The blood pressure in millimeters of mercury was 130 systolic and 80 diastolic.

The abdomen was only slightly distended. There was pain over the entire right side of the abdomen; this was more severe in the right upper quadrant. There was some rigidity over the right upper quadrant which seemed to extend downward toward the McBurney region. There was moderate borborygmus. The liver, kidney and spleen were not palpable. No scar or hernia was present. The legs showed no varicosities and no edema.

Neurologically the patient presented spastic hemiplegia of the right side. The right upper extremity assumed a posture of adduction; the forearm was flexed, and the hand pronated in flexion. The musculature of the right lower extremity appeared contracted, with the foot assuming the equinovarus position. The superficial and deep reflexes were exaggerated on the right side, with absence of the abdominal and cremasteric reflexes; wrist, patellar and ankle clonus were present.

The erythrocyte count was 4,470,000 per cubic millimeter of blood; the leukocyte count, 14,750, with 88 per cent polymorphonuclears. The value for hemoglobin was 85.8 per cent.

The urine was clear and amber, with an acid reaction. The specific gravity was 1,024. The value for albumin was 750 mg. The test for sugar gave a negative result. There were occasional red blood cells with fine and coarse granular casts. The blood type was II, Rh positive, and the Wasserman reaction was negative.

A warm soapsuds enema gave good results; the solution returned, moderately colored with a large amount of light brown stool.

A primary diagnosis of mesenteric thrombosis was considered, based upon the history, and conservative management was deemed wise at this time. The patient was given 2,000 cc. of 5 per cent dextrose with 500 mg. of ascorbic acid and one ampule of Solu-B intravenously and 300,000 units of duracillin intragluteally.

On September 7, the second hospital day, the temperature had risen to 103 F.; the pulse rate was 108 and the respiratory rate 50; the beat was rapid and shallow, with profuse diaphoresis. Roentgen examination of the chest showed a widened arteriosclerotic aorta with prominence of the left ventricle. There was some congestion in the base of the right lung. A flat film of the abdomen showed numerous abnormally distended loops of small bowel, indicating moderately advanced ileus. The leukocyte count was now 20,500 per cubic millimeter of blood. A Wangensteen decompression was started, and the patient was taken to the operating room for exploratory laparotomy.

One per cent sodium pentothal was administered, supplemented with cyclopropane-oxygen, and the abdomen was opened through a right rectus incision. Three cc. of d-tubocurarine chloride was administered intravenously for additional relaxation after the skin was incised.

The peritoneal cavity contained about 100 cc. of dark, purulent fluid. Fibrinous peritonitis was present along the right lesser peritoneal cavity. The cecum and ascending colon adhered to the lateral peritoneal wall and the appendix and mesoappendix were swollen, discolored (greyish red), and covered with a loosely adherent, thick, soft, grey-

yellow membrane. An appendectomy was performed, with use of No. 0 chromic catgut. The stump was not inverted. Exploration of the biliary region was deemed wise and was well rewarded. Here we encountered a large walled-off mass which yielded several pea-sized calculi lying free in the abdominal cavity. The incision was extended upward and revealed a ragged perforation of the gallbladder on the inferior surface of Hartmann's pouch. The mucosa was dark and discolored, friable, ulcerated and partially desquamated.

The gallbladder was opened freely at its fundus, and all calculi were removed. A cholecystostomy was performed. A Penrose drainage tube was placed in Morison's pouch and another in Douglas' pouch. Sulfathiazole crystals were powdered throughout the peritoneal cavity, and the abdomen was closed in layers.

For three days the patient remained critically ill but improvement gradually took place. Prostigmine (1:2,000) was given every three hours for two days and then three times daily for two days. Duracillin (300,000 units) was given twice daily for ten days. Two transfusions of whole blood (250 cc. each), were given; the patient was encouraged to turn from side to side frequently; intranasal oxygen was given at intervals when breathing became difficult; 2,000 cc. of 5 per cent dextrose with 500 mg. of ascorbic acid and one ampule of Solu-B was given intravenously daily for three days. This was supplemented with vitamin K three times daily for twelve days.

After the fourth day the patient showed signs of improvement and the Wangensteen procedure was gradually discontinued. The tubes in Morison's and Douglas' pouch were removed on the eighth day. Bile drained for thirteen days. The tube in the gallbladder was then removed, and the patient was discharged in good condition after twenty-three days in the hospital.

SUMMARY AND CONCLUSIONS

1. Acute perforation of the gallbladder is more common than is generally believed.

2. Because of its confusion with other acute abdominal conditions, it is rarely diagnosed preoperatively.

3. There are no symptoms pathognomonic of perforation of the gallbladder.

4. Acute disease of the gallbladder is potentially a life-threatening condition.

5. For the elderly patient to whom the ordinary expectant treatment of acute cholecystitis causes continued anxiety, exploratory laparotomy is urged.

6. Prophylactic cholecystectomy in cases in which calculi have been visualized reduces the incidence of perforation, thereby lowering the mortality rate.

7. Adequate nutritional balance is a necessary adjunct in treatment of paralytic ileus, especially in the aged. Full hydration, protein and vitamin balance must be kept up parenterally.

8. The high mortality of gallbladder perforation makes this type of disease a surgical emergency.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

1. Die akute Perforation der Gallenblase tritt haeufiger auf, als man allgemein glaubt.

2. Die Erkrankung wird selten vor der Operation erkannt, weil sie mit anderen akuten Baucherkrankungen verwechselt wird.

3. Die Perforation der Gallenblase hat keine pathognomonischen Krankheitszeichen aufzuweisen.

4. Akute Gallenblasenerkrankungen sind potentiell lebensbedrohende Zustaende.

5. Fuer aeltere Kranke, denen die uebliche abwartende Behandlung einer akuten Gallenblasenentzuendung dauernde Angst und Beunruhigung einfloesst, wird die Probelaparotomie dringend angeraten.

6. Durch prophylaktische Resektion der Gallen blase in Faellen, bei denen Steine nachgewiesen werden konnten, wird die Haeufigkeit von Perforationen und damit die Sterblichkeitsziffer herabgesetzt.

7. Ausreichende Nahrungszufuhr ist ein wesentlicher Faktor in der Behandlung der Darmlaehmung, besonders bei aelteren Kranken. Die Bilanz von Fluessigkeit, Eiweiss und Vitaminen muss auf parenteralem Wege aufrechterhalten werden.

8. Die hohe Sterblichkeitsziffer des

Gallenblasendurchbruchs macht diese Erkrankung zu einem chirurgischen Notzustand.

RÉSUMÉ

1. La perforation de la vésicule biliaire est plus fréquente qu'on ne le croit.

2. Souvent confondue avec d'autres lésions aigues de l'abdomen, le diagnostic pré-opératoire de cette lésion est rarement fait.

3. Il n'y a pas de symptômes pathognomoniques de la perforation de la vésicule biliaire.

4. Chez les patients agés où habituellement ontend à patienter s'ils sont en crise aigue et où l'anxiété est grave, on doit pratiquer une exploration par la laparatomie.

5. Une vésicule biliaire à syndrôme aigu menace la vie du patient.

6. La cholécystectomie préventive, surtout s'il y a calculs, diminue les chances de perforation et conséquemment de mortalité.

7. Il faut balancer adéquatement la diète chez les patients souffrant d'iléus paralytique, une hydration abondante, des protéines et des vitamines doivent être données par voie parentérale.

8. Le taux de mortalité élevé des cas de perforation de la vésicule en fait une urgence chirurgicale.

RESUMEN Y CONCLUSIONES

1. La perforación aguda del colecisto es más común de lo que generalmente se cree.

2. Su diagnóstico preoperatorio es raro por confundirse con otros estados abdominales agudos.

3. No hay síntomas patognomónicos de perforación del colecisto.

4. La enfermedad aguda del colecisto es una amenaza potencial para la vida.

5. Se impone laparotemía exploradora en el paciente de edad madura, en quien el tratamiento expectante ordinario de la colecistitis aguda produce ansiedad continua.

6. La colecistectomía profiláctica en casos con litiasis evidente reduce la incidencia de perforación y por ende el índice de mortalidad.

7. El equilibrio adecuado de la nutrición se asocia necesariamente en el tratamiento del íleo paralítico, especialmente en los ancianos. Debe mantenerse parenteralmente la hidratación debida y el equilibrio proteínico y vitamínico.

8. La alta mortalidad de la perforación del colecisto hace este tipo de enfermedad una emergencia quirúrgica.

RIASSUNTO E CONCLUSIONI

1. Perforazione acuto della cistifellea e' piu comune che sia generalmente creduto.

2. A caglion che esiste confusione con alte condizioni addominale, e' raremente fatto la diagnosi preoperatoria.

3. Non vi sono sintomi patognomonico della perforazione della cistifellea.

4. Malattia acuta della cistifellea e' in virtualita' minaccioso alla vita.

5. Per il paziente anziano nel quale trattamento aspettante per colecistite acuta da' luoga di ansieta' continuo, si avanza laparotomia esploratore.

6. Colecistectomia profilattica nei casi che dimostrano calcoli abbassa l'incidenza di perforazione, per cio' minacciante la tassa di mortalita'.

7. Nutrizione inbilancia sufficiente e' un aggiunto necessario nel trattamento di ileo paralitico, specialmente nel vecchio. Idrazione abbondante, aquilibrio di proteine e vitamine deve essere sostenuto parenteralmente.

8. La mortalita' alta di perforazione di cistifellea rende questo tipo di malattia un avvenimento chirurgico.

SUMÁRIO

1) A perfuração agúda da vesícula biliar é mais comun do que geralmente se acredita.

2) Devido à sua confusão com outras condições abdominais agúdas ela é raramente diagnosticada pre-operatoriamente.

3) Náo ha sintomas patognomônicos de

perfuração da vesícula biliar.

4) Uma doença aguda da vesícula biliar é potencialmente uma condição de perigo para a vida do paciente.

5) Nos pacientes idósos em que os tratamentos expectantes usuais de colecistite aguda causam contínua ansiedade a laparotomia exploradôra se impõe.

6) A colecistectomia profilática nos casos em que os cálculos foram visualizados redúz a incidencia de perfuração, de onde se segue a redução do índice de mortalidade.

7) O equilíbrio nutricional adequado é corolário imprescindivel no tratamento do ileo paralítico, especialmente em pacientes idosos. Compléta hidratação tanto quanto equilibrio proteico e vitamínico devem ser mantidos por via parenteral.

8) A alta mortalidade de perfuração da vesícula biliar confére a esta doença o carater de enfermidade cirúrgica de urgencia.

REFERENCES

1. Johnstone, G. A., and Ostendorph, J. E., Cholecystitis with Perforation, Arch. Surg. 53:1, 1946.

2. Cowley, L. L., and Harkins, H. N., Perforation of the Gallbladder; A Study of 25 Consecutive Cases, Surg., Gynec. & Obst. 77: 661-668, 1943.

3. Judd, E. S., and Phillips, J. R.: Acute Cholecystic Disease, Trans. Am. Surg. Assoc. 51:292-300, 1933. Wallace, R. H., and Allen, A. W.: Acute Cholecystitis, Arch. Surg. 43:762-772, 1941. Heuer, G. L.: Factors Leading to Death in Operations Upon the Gallbladder and Bile Ducts, Ann. Surg. 99:881-892, 1934.

4. Sanders, R. L.: Perforation of the Gallbladder; Analysis of 46 Cases, Surgery 1:949-958, 1937.

5. McGuigan, W. J.: Acute Cholecystitis, Am. J. Surg. 68:219-228, 1945.

6. Cited by Eliason, E. L., and McLaughlin, C. W.: Perforation of the Gallbladder, Ann. Surg. 99:914-921, 1934.

7. Heuer, G. L.: Surgical Aspects of Acute Cholecystitis, Ann. Surg. 105:758-764, 1937.

8. Gosset, A.; Desplos, B., and Bonnet, L.: Les perforations de la vesicule biliare lithiasique en peritoine libre, J. de Chir. Paris. 25:257-282, 1925.

9. Edwards, C. R.; Gerwig, W. H., Jr., and Guyton, W. L.: Acute Cholecystitis with Perforation into the Peritoneal Cavity, Ann. Surg. 113:824, 1941.

10. Mailer, R.: Spontaneous Rupture of the Gallbladder with Massive Intraperitoneal Hemorrhage, Brit. J. Surg. 27:91-99, 1939.

11. Kalvelage, E. B., and Cangelosi, J. P.: Intestinal Obstruction Due to Gallstone, Am. J. Surg. 73:108-110, 1947.

12. Blain, A., and Harkins, H. N.: Intestinal Obstruction Due to Perforation of the Gallbladder, Surgery 21:110-135, 1947.

13. Walters and Snell: Diseases of the Gallbladder and Bile Ducts. Philadelphia: W. B. Saunders Company, 1940.

The Eighth International Assembly

of the

International College of Surgeons

will be held in

Madrid, Spain

May 20-24, 1952

Editorials

Iodine as a Skin Antiseptic Prior to Abdominal Operations

BERNARD J. FICARRA, M.D., F.I.C.S.*
BROOKLYN

ALTHOUGH iodine has been used for over a century by the medical profession, it has not always been first choice as an antiseptic for the skin. Nevertheless, in spite of any temporary loss of popularity, iodine remains one of the finest antiseptics available.

A study was made in which two different aqueous iodine solutions were employed interchangeably in 100 consecutive patients prior to abdominal surgery. The preparations were idodine solution N.F. IX and iodine-propylene glycol solution, with the following formulas:

Iodine Solution N.F. IX	
Iodine	20 Gm.
Sodium Iodide	24 Gm.
Distilled Water q.s.	1,000 cc.
Solution Iodine-Propylene Glycol	
Iodine	20 Gm.
Sodium Iodide	24 Gm.
Propylene Glycol	250 cc.
Distilled Water q.s.	1,000 cc.

In accordance with tradition, soap and water were employed to cleanse the skin, and this was followed by application of the chemical antiseptic. After the iodine solution had been applied, the excess moisture was removed with a dry sponge, leaving a uniform iodine stain on the skin. After the operation iodine solution was applied to the wound site and excess moisture removed. The same procedure was followed at each dressing.

In this series, which comprised 100 consecutive operative cases, no postoperative wound infections and no untoward reactions (such as cutaneous burns) followed the use of these two aqueous iodine solutions.

The aforementioned solutions fulfill the requirements of an ideal skin antiseptic or sterilizing agent as postulated by others.[1] These requirements are: (1) it must kill bacteria in a reasonably short time; (2) it must not be neutralized by contact with small amounts of serum, fats, soaps or oils; (3) its effect should last at least throughout the operation; (4) it must not be irritating to the skin, and (5) it should be colored to show where it has been applied.

An antiseptic which possesses these attributes and in addition is reasonably cheap should be considered an ideal preoperative skin-cleansing agent. Aqueous iodine fulfills these requisites and is cheap enough to appeal to the most zealous advocate of economy.

Many authors have proved the value of iodine as an antiseptic.[2] Experience based on more than 100 consecutive abdominal operations substantiates the efficacy of iodine as an antiseptic.

*Associate Visiting Surgeon, St. Peter's Hospital and Hospital of the Holy Family, Brooklyn.

1. Bost, T. C.: An Experimental Comparison of Certain "Skin-Sterilizing" Agents, North Carolina M. J. 5:133-136, 1944.

2. Gershenfeld, L. and Witlin, B.: Iodine as an Antiseptic. Ann. New York Acad. Sci. 53:172-182, 1950. Gershenfeld, L. and Patterson, G. W.: Bactericidal Efficiency of Iodine Solutions and Organic Mercurial Antiseptics. Am. J. Pharm. 117: 5-11, 1945. Gershenfeld, L., and Witlin, B.: Evaluation of the Antibacterial Efficiency of Dilute Solutions of Free Halogens, J. Am. Pharm. Assoc. 38:411-413, 1949. Nye, R. N.: The Relative In Vitro Activity of Certain Antiseptics in Aqueous Solution, J. A. M. A. 108:280-287, 1937. Gershenfeld, L., and Witlin, B.: Iodine-Propylene Glycol Solutions. J. Am. Pharm. Assoc. 39:489-492, 1950. Salle, A. J. and Catlin, B. W.: Profile Evaluation of Germicides. J. Am. Pharm. Assoc. 36:129-133, 1947.

Summing Up the Summaries

IN A recent issue of *Science* there appeared a letter from a reader who mildly reproached another reader for complaining that certain journals published abroad carry no summaries in English. "It strikes me," he says, in substance, "that Mr. — is on thin ice when he rebukes these journals for chauvinism because they publish only in their mother tongues. What American journal condescends to print foreign résumés? None!"

One must admire this contributor's sense of justice, but his habits of observation have failed him here. The *Journal of the International College of Surgeons*, from its very inception, has made it a matter of policy to publish summaries in several languages besides English. Each article now carries, in addition to its English summary, a résumé in French, German, Spanish, Italian and Portuguese. Pending the invention of an international language that shall satisfy everybody (should everybody live so long), we find this the best possible means of making our material universally available.

Since all of our summaries are translated directly from the authors' English versions, they vary in length and detail. Even the shortest of them, however, tells the reader clearly what the subject is, what conclusions have been drawn and whether the material is apposite to his field of work. This, together with good illustrations and tables, supplies him with valuable data and current comment even though he does not read a word of English. He is saved much time in selecting the articles he wishes to explore by translation.

But there is more than a utilitarian value here. The *Journal* is the official publication of an organization dedicated to the free exchange of scientific knowledge without regard to national boundaries; some such arrangement is therefore mandatory, if only as a matter of courtesy and respect to our colleagues abroad. But even if this were an exclusively American publication we should not consider ourselves relieved of the obligation in the light of present world conditions. We cannot afford to close any avenue of communication nowadays. Since it is obviously impossible to publish whole articles in six different languages each month, we feel that the summaries represent the best practicable substitute. It will be a long time before a universal language is available, if indeed this ever comes to pass.

Since we are indebted to *Science's* correspondent for the topic of this editorial, we must not fail to admit here that in one respect he is absolutely right. "What American journal condescends to print foreign résumés? None!"

Not, most emphatically, the *Journal of the International College of Surgeons*. The publication of summaries in other languages is not a condescension, it is a privilege and a pleasure. Nobody with even slight knowledge of the crisp, inimitable suavity of the French language, the infinite emotional and intellectual variety of the German, the melodious beauty of the Spanish or the magnificent classical heritage of the Italian can possibly feel condescending toward these tongues. The same is true of every language spoken. Each is a fathomless mine of peculiar treasure, and the deeper the acquaintance the higher one's respect.

Meanwhile, it seems we are unique and didn't know it. What a wonderful thing to discover about oneself! It has quite made our day. Indeed, we remember, with a fond sense of kinship, a gentleman we met many years ago—that memorable character of Moliére who, on being told the meaning of the word "prose", exclaimed with rapture that he had been speaking it all his life and never realized it!—M. T.

Chapter News

International College of Surgeons

United States Chapter

Arnold S. Jackson, M.D., F.A.C.S., F.I.C.S., Secretary

Chicago Assembly: Plans are well on the way to completion for the forthcoming Assembly in Chicago this year, September 10-13 inclusive, with headquarters at the Palmer House. The officers of the United States Chapter extend to all members of the medical and surgical professions of America and the world a cordial invitation to attend. An excellent clinical program has been arranged (see Page 121 et seq.), which will afford a comprehensive review of the latest concepts in surgery by world-renowned teachers.

Committees: The following Committees are responsible for the various departments of Assembly procedure:

Arrangements

Chairman of the Assembly
RAYMOND W. MCNEALY, M.D., F.A.C.S., F.I.C.S., Chicago

Co-Chairmen
KARL A. MEYER, M.D., F.A.C.S., F.I.C.S., Chicago
MAX THOREK, M.D., LL.D., D.Sc., F.I.C.S., F.B.C.S., Chicago

Banquet

CHESTER W. TROWBRIDGE, M.D., F.A.C.S., F.I.C.S., Chicago

Convocation

Chairmen
HARRY A. OBERHELMAN, M.D., F.A.C.S., F.I.C.S., Chicago
CLEMENT L. MARTIN, M.D., F.A.C.S., F.I.C.S., Chicago

ERNEST F. PURCELL, M.D., F.I.C.S., Trenton, New Jersey
FRANCIS D. WOLFE, M.D., F.A.C.S., F.I.C.S., Chicago
CLAIRE E. CARR, M.D., F.A.C.S., F.I.C.S., Chicago
HORACE F. TURNER, M.D., F.A.C.S., F.I.C.S., Chicago
LOUIS F. PLZAK, M.D., F.A.C.S., F.I.C.S., Berwyn, Illinois
WALTER C. BURKET, M.D., F.I.C.S., Evanston, Illinois

Motion Picture Program

PHILIP THOREK, M.D., F.A.C.S., F.I.C.S., Chicago

General Program

ARNOLD S. JACKSON, M.D., F.A.C.S., F.I.C.S., *Chairman*, Madison, Wisconsin

Motion Picture Program: Dr. Philip Thorek, in charge of the Motion Picture Program, announces that a program has been arranged which will appeal to surgeons and specialists alike.

Although technic is the point of greatest focus, emphasis is placed upon the newer type of film which presents the subject in its entirety.

The scope of the program includes the

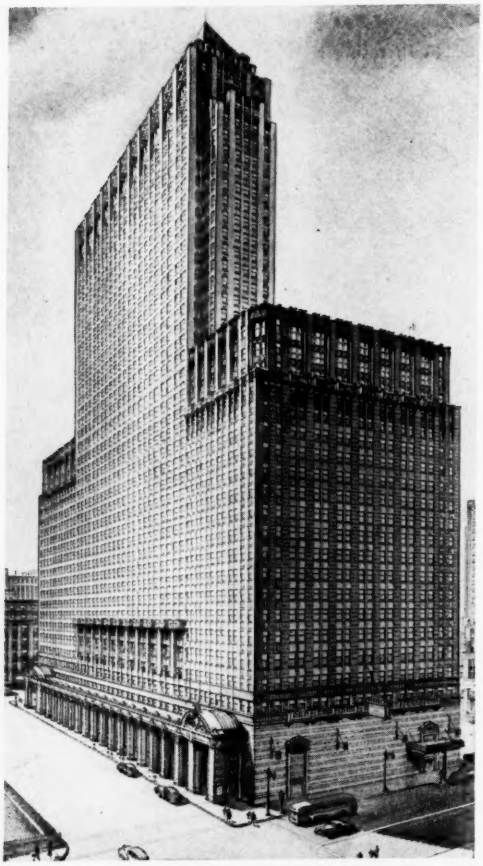
The Palmer House, Chicago.

most recent surgical films pertaining to orthopedics, proctology, gynecology, the heart, the esophagointestinal tract, ophthalmology, the thorax, the nervous system, the biliary passages, the genitourinary system, the thyroid gland, the cardiovascular diseases, et cetera.

A Film Forum also is to be presented in which five surgical films will be shown, with the surgeon present to discuss his film.

The Preliminary Program appears in this issue, Page 129.

Banquet: The Annual Banquet will be held in the Grand Ballroom of the Palmer House at 7:30 p.m. on the evening of Wednesday, September 12. The banquet speaker will be Mr. A. Lawrence Abel of London, whose topic will be "What Is Happening in Britain—Fact and Fiction." Mr. Abel is a Fellow of the Royal College of Surgeons of England and a member of its Council; Senior Surgeon at the Princess Beatrice Hospital and the Gordon Hospital for Rectal and Gastroenterological Diseases; Surgeon to the Royal Cancer Hospital; President of the Metropolitan Counties Branch of the British Medical Association and Council Member of that organization; Honorary Fellow of the American Medical Association, the American Proctologic Society and the International College of Surgeons.



Chicago Civic Opera House.

Convocation: The Convocation ceremonies, with induction of new members of the United States Chapter of the College, will be held at the Civic Opera House on Thursday evening, September 13. The Honorable Estes Kefauver, United States Senator from Tennessee, will give the Convocation Address. His subject is "The America of Tomorrow."

Assembly Information: The following points are important:

Hotel Reservations: See inside front cover.

Registration, Sunday 2:00 p.m. through Thursday, 3:00 p.m., September 9-13, Palmer House, Chicago.

Advance registration (on Sunday) will save time.

Admission by badge only to all scientific Assemblies, section meetings, and to the exhibits. Present your I. C. of S. membership card to expedite registration. Registration fee, $5.00.

Bona fide doctors of medicine serving as residents and interns, if vouched for by written card or letter by the superintendent of their hospital or by an officer of the College, will be registered as guests. Please present credentials at Registration Desk.

Banquet—Grand Ballroom, Palmer House, Chicago, Wednesday, September 12.

Convocation—Thursday, September 13, Chicago. Civic Opera House. A colorful pageant symbolizing the international aspects of the College. Tickets available at Registration Desk for members of the International College of Surgeons, all registrants, their families and guests **(no admission fee).**

One hundred thirty-seven scientific and technical exhibits will open daily at 8:30 a.m. and close at 5:30 p.m. Frequent intermissions to view the exhibits have been arranged be-

fore, during and after the assemblies.

Motion picture programs, incorporating modern surgical technics will be presented in the Scientific Exhibit Hall by Davis & Geck, Inc., Brooklyn, N. Y. The films will show continuously on Monday, Tuesday, Wednesday, Thursday, September 10-13, from 10:00 a.m. to 4:30 p.m.

For copy of Final Program, write the Secretary, Dr. Arnold S. Jackson, F.A.C.S., F.I.C.S., 1516 Lake Shore Drive, Chicago, Ill.

Dr. Crotti Honored: Dr. André Crotti, F.A.C.S., F.I.C.S., distinguished goiter specialist and founder of the Columbus Cancer Clinic in Columbus, Ohio, was highly honored by his colleagues at a recent meeting of the American Goiter Society in Columbus. Dr. Crotti is a co-founder of this organization, which held its first meeting in Bloomington, Illinois, in 1923. During presentation of a scroll of honor and a ring to Dr. Crotti for his outstanding services in the field of goiter research, the assemblage of some 250 notables in the profession spontaneously accorded him a standing ovation lasting several minutes. The *Journal* adds its warmest congratulations and those of the College.

Turkish Chapter: The Turkish Chapter of the International College of Surgeons held its second quarterly meeting on May 12, 1951, in the auditorium of the First Surgical Clinic of the Djerrahpasha Hospital in Istanbul. Owing to the illness of the President, Dr. Burhaneddin Toker, the Vice-President, Dr. Feridun Sevket Evrensel, presided.

The following program was presented:

Results of Pericardiolysis in a Case of Adhesive Tuberculous Pericarditis, by Dr. Feridun Sevket Evrensel

Total Gastrectomy in Gastric Carcinoma, Prof. Dr. Fahri Arel and Dr. B. Goroon

Surgery of Hypertension, Dr. Feyyaz Berkay

Arteriography in Traumatic Arteriovenous Aneurysms (Presentation of cases) by Dr. Dervis Manizade

Excision and Primary Closure in Open Fractures (primary closure resulting from an intervention after 24 hours on an open fracture of leg) by Dr. Dervis Manizade.

Dr. Esnaurrizar Honored: Dr. Miguel Lopez Esnaurrizar, F. I. C. S., National Regent of the Mexican Chapter, International College of Surgeons, has been elected President of the Franco-Mexican Medical Association for the year 1951.

Argentina: The Argentine Society of Thoracic Surgery organize Four Argentine Days of Thoracic Surgery and the First Latin-American Days of Thoracic Surgery in Buenos Aires on July 2-7, 1951. The present Board of Directors of the Society is composed of distinguished members of the International College of Surgeons.

Brazil: A meeting of the Brazilian Chapter of the International College of Surgeons was held in São Paulo on May 30, 1951, at which time the following officers were elected for 1951 and 1952:

President, Dr. José Avelino Chaves
President-Elect, Dr. Oscar Cintra Gordinho
Vice-President, Prof. Dr. Rodolpho de Freitas
Secretary, Dr. Waldyr da Silva Prado
Assistant Secretary, Dr. Lauro de Barros Abreu
Treasurer, Dr. José Maria Caselo Campos
Assistant Treasurer, Dr. Roberto Oliva

New officers for the following Surgical Sections of the Brazilian Chapter have been announced:

Salvador
President, Prof. Dr. Benjamin da Rocha Salles
Vice-President, Dr. Mathias Mariani Bittencourt
Secretary-Treasurer, Dr. Eduardo Dantas Cerqueira
Delegate: Prof. Dr. Benjamin da Rocha Salles
Assembly Chairman, Dr. Fernando Luz, Filho

Bello Horizonte
President, Dr. José Bolivar Drumond
Vice-President, Dr. João Rezende Alves
Secretary-Treasurer, Dr. Oswaldo Borges da Costa
Delegate, Prof. Otto Pires Cirne
Assembly Chairman, Dr. Sylvio Miraglia

Ribeirão Preto
President, Dr. Paulo Valentie de Oliveira
Vice-President, Dr. Cesareo Horta
Secretary-Treasurer, Dr. Paulo Hoelz
Delegate, Dr. Fabio dos Santos Muza
Assembly Chairman, Dr. Joaquim Aurelio Cardoso, Filho

Recife
President, Prof. Dr. Arminio Lalor Motta

Vice-President, Prof. Dr. Romero Marques
Secretary-Treasurer, Dr. Gilson Machado
Delegate, Dr. Francisco Beiró Uchoa
Assembly Chairman, Prof. Arminio Lalor Motta

Central Brazil
President, Dr. José de Paiva Abreu
Vice-President, Dr. Euclides de Freitas
Secretary-Treasurer, Dr. Eruipedes Garcia
Delegate, Dr. Arnaldo Godoy
Assembly Chairman, Dr. José Humberto Rodrigues da Cunha

Santos
President, Dr. Carols Moreira Gomes
Vice-President, Dr. Carlos Ribeiro Gomes
Secretary-Treasurer, Dr. Arcy Rodrigues Martins
Delegate, Dr. Arthur Domingues Pinto
Assembly Chairman, Dr. Emilio Navajas

Fortaleza
President, Dr. Haroldo Gondim Juacaba
Vice-President, Dr. Paulo de Melo Machado
Secretary-Treasurer, Dr. Livinio Virginio Pinheiro
Delegate and Assembly Chairman, Dr. José Carlos Ribeiro

Campinas
President, Dr. Alfredo Gomes Julio
Vice-President, Dr. Gabriel Oliveira Porto
Secretary-Treasurer, Dr. Armando Rocha Brito
Delegate, Dr. Alfredo Gomes, Junior
Assembly Chairman, Dr. José Giordano

The officers of the Brazilian Chapter and of the Surgical Sections of the Brazilian Chapter will be installed at a solemn ceremony to be held at the close of the First Assembly Chapter on Sept. 30, 1951.

For information pertaining to qualifications for

Fellowship, Associate Fellowship and Junior Membership in the

United States Chapter, International College of Surgeons

Please communicate with

Dr. Arnold S. Jackson, *Secretary*

1516 Lake Shore Drive

Chicago 10, Illinois

Preliminary Program

Sixteenth Annual Assembly

United States Chapter

INTERNATIONAL COLLEGE OF SURGEONS

Grand Ballroom, Palmer House

Monday, September 10, 1951

MORNING SESSION

Presiding: W. Wayne Babcock, M.D., LL.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylania
Secretary: Kenneth Sawyer, M.D., F.A.C.S., F.I.C.S., Denver, Colorado

Symposium on Surgery of the Colon

A.M.

9:00- 9:20 **Glassman, Jacob A., M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Associate Clinical Professor, Surgery, Cook County Graduate School of Medicine; Associate Attending Surgeon, Cook County Hospital.
"Some Practical Anatomical Considerations in Colon Surgery"

9:20- 9:40 **Popper, Hans, M.D., Ph.D.**
Chicago, Illinois
Director, Department of Pathology, Cook County Hospital; Scientific Director, Hektoen Institute for Medical Research; Associate Professor, Pathology, Northwestern University Medical School.
"Newer Aspects of the Pathology of the Colon"

9:40-10:00 **Case, James T., M.D., D.M.R.E., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Professor Emeritus of Radiology, Northwestern University Medical School; Radiologist, Highland Park Hospital; Consultant to U. S. Public Health Service and Passavant Memorial Hospital; Consultant in Surgery, Battle Creek Sanitarium.
"The Roentgenologic Findings in Carcinoma of the Colon"

10:00-10:40 **Intermission to View Exhibits**

10:40-11:00 **Portis, Sidney A., M.D., F.A.C.P.**
Chicago, Illinois
Associate Clinical Professor of Medicine, University of Illinois (Rush); Medical Chief of Psychosomatic Group, Michael Reese Hospital.
and
Lawrence, Charles H., M.D.
Chicago, Illinois
Clinical Assistant in Medicine, Northwestern University Medical School.
"The Early Diagnosis of Carcinoma of the Colon"

11:00-11:20 **McNealy, Raymond W., M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Professor of Surgery, Cook County Graduate School of Medicine; Associate Professor of Surgery, Northwestern University Medical School; Chief Surgeon, Wesley Memorial Hospital.
"Surgery of the Right Colon"

11:20-11:40 **Rosi, Peter A., M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Associate Professor of Surgery, Northwestern University Medical School; Attending Surgeon, Wesley and Cook County Hospitals.
"Surgical Treatment of Carcinoma of the Left Colon and Rectum"

11:40-12:00 **Wolfe, Francis D., M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Instructor in Surgery, Northwestern University Medical School; Attending Surgeon, Wesley Memorial Hospital.
"Diverticulitis of the Colon"

AFTERNOON SESSION

Presiding: W. R. Lovelace, M.D., F.I.C.S., D.I.B.S., Albuquerque, New Mexico
Secretary: H. H. Sharp, M.D., A.I.C.S., Downington, Pennsylvania

P.M.

2:00- 2:20 **Starry, Leo J., M.D., F.A.C.S., F.I.C.S.,** Oklahoma City, Oklahoma
Professor of Clinical Surgery and Director of Surgical Clinics, University of Oklahoma School of Medicine; Attending Surgeon, University Hospital and Oklahoma Hospital for Crippled Children; Chief of Staff, St. Anthony Hospital.
and
Dodson, Harrell, M.D.
Oklahoma City, Oklahoma
"Carcinoma of the Stomach"

2:20- 2:40 **Peterson, Frank R., M.D., F.A.C.S.**
Cedar Rapids, Iowa
Former Professor and Head of Department of Surgery, University of Iowa College of Medicine.
"Morbidity due to Incomplete Cholecystectomy"

2:40- 3:00 **Bacon, Harry E., M.D., F.A.C.S., F.A.P.S., F.I.C.S., F.R.S.M.**
Philadelphia, Pennsylvania
Professor and Head, Department of Proctology, Temple University Medical School; Head, Department of Proctology, St. Mary's Hospital.
and
McCrea, Lowrain E., M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania
and
Trimpi, Howard D., M.D.
Philadelphia Pennsylvania
"Pelvic Exenteration for Rectal Carcinoma with Cutaneous Ureterostomy"

3:00- 3:20 **Nordland, Martin, M.D., F.A.C.S.**
Minneapolis, Minnesota
Associate Clinical Professor, Surgery, University of Minnesota Medical School; Surgical Consultant, Glen Lake Sanatorium; Surgeon, Northwestern Hospital, Minneapolis.
"Retroperitoneal Tumors"

3:20- 3:40 **White, Charles S., M.D., Sc.D., F.A.C.S., F.I.C.S.**
Washington, D. C.
Chief Department of Surgery, Doctors Hospital.
and
Stubbs, Donald, M.D.
Washington, D. C.

"Intra-Arterial Transfusions in the Treatment of Massive Gastroduodenal Hemorrhage"

3:40- 4:10 **Intermission to View Exhibits**

4:10- 4:30 **McGregor, Douglas U., M.D., C.M., F.I.C.S.**, Hamilton, Canada.
Consulting Surgeon, St. Joseph's and Mountain Hospitals; Honorary Surgical Consultant, Hamilton General Hospital.
"Terminal Ileum Duplex"

4:30- 4:50 **Harper, Fred R., M.D., F.A.C.S.**
Denver, Colorado
Associate Professor of Surgery and Head of Department of Thoracic Surgery, University of Colorado School of Medicine.
"An Outline for the Treatment of Thoracic Injuries"

EVENING SESSION

P.M.
5:30 **Business meeting and dinner, Canadian Chapter of International College of Surgeons**

Film Forum: Scientific Motion Picture Program, with authors of film shown present for discussion.
Dr. Philip Thorek, Chicago, *Chairman*

Tuesday, September 11

MORNING SESSION

Presiding: Moses Behrend, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania
Secretary: George Ferre, M.D., F.I.C.S. Miami Beach, Florida

A.M.
9:00-10:30 **PANEL DISCUSSION: "The Acute Surgical Abdomen"**

Jackson, Arnold S., M.D., F.A.C.S., F.I.C.S., Madison, Wisconsin, *Moderator*
Burns, Charles W., M.D., F.A.C.S., F.I.C.S., Winnipeg, Canada
Howser, John W., M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
Hendricks, William A., M.D., F.I.C.S., Chicago, Illinois
Vaughn, Arkell M., M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
Lichtenstein, Manuel E., M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
Coffey, Ralph R., M.D., F.A.C.S., F.I.C.S., Kansas City, Missouri

10:30-11:00 **Intermission to View Exhibits**

Cardiovascular Symposium

11:00-11:20 **Fell, Egbert H., M.D., F.A.C.S.**
Chicago, Illinois
Clinical Associate Professor of Surgery, University of Illinois Medical School: Attending Surgeon, Presbyterian and Cook County Hospitals; Consultant in Cardio-Vascular Surgery, Mt. Sinai Hospital.
"Surgery for Congenital Anomalies of the Arch of the Aorta"

11:20-11:40 **Potts, Willis J., M.D., F.A.C.S.**
Chicago, Illinois
Associate Professor of Surgery, Northwestern University Medical School: Surgeon-in-Chief, Children's Memorial Hospital.
"Evaluation of the Surgical Treatment of Congenital Pulmonary Stenosis"

11:40-12:00 **Pearl, Felix L., M.D., F.A.C.S., F.I.C.S.**, San Francisco, California
Chief, Department of Sympathetic and Vascular Surgery, Mount Zion Hospital.
"Roentgenologic Visualization of the Coronary Arteries in the Intact Animal"

12:00-12:20 **Samuels, Saul S., M.D.**
New York, New York
Director and Attending Angiologist, The Brooklyn Hospital for the Aged; Chief Department of Peripheral Arterial Diseases, Stuyvesant Polyclinic Hospital; Associate Attending Angiologist, Manhattan General Hospital.
"Treatment of Gangrene of the Extremities"

AFTERNOON SESSION

Presiding: Curtice Rosser, M.D., F.A.C.S., F.I.C.S., Dallas, Texas
Secretary: Ralph E. Scovel, M.D., F.I.C.S., San Francisco, California

P.M.
2:00- 2:20 **Maxeiner, Stanley R., M.D., F.A.C.S., F.I.C.S.**, Minneapolis, Minnesota
Clinical Professor of Surgery, University of Minnesota Medical School; Senior Consultant in Surgery, U. S. Veterans Hospital, Minneapolis.
"Synovioma: Review of the Literature, Diagnosis, Pathology, Treatment, End Results"

2:20- 2:40 **Kurten, Russell M., M.D., F.A.C.S.**
Racine, Wisconsin
Chief of Surgery, St. Mary's Hospital; Consulting Surgeon, St. Luke's Hospital.
"Management of Intestinal Fistula"

2:40- 3:00 **Koontz, Amos R., M.D., D.Sc. (Hon.), F.A.C.S.**, Baltimore, Maryland
Assistant Professor of Surgery, Johns Hopkins University School of Medicine.
"Difficult Hernias: Use of Tantalum Mesh in Repair"

3:00- 3:20 **Adson, Alfred W., M.D., F.A.C.S., F.I.C.S. (Hon.)**, Rochester, Minnesota
Professor of Neurosurgery, Mayo Foundation; Senior Neurosurgeon, Mayo Clinic.
"Cervical Ribs: Symptoms, Differential Diagnosis and Indications for of the Insertion of the Scalenus Anticus Muscle"

3:20- 4:00 **Intermission to View Exhibits**

4:00- 4:20 **Marshall, Samuel F., M.D., F.A.C.S.**
Boston, Massachusetts
Surgeon, Lahey Clinic, New England Deaconess Hospital and New England Baptist Hospital.
"Follow-up Results of Surgery in Gastric Cancer; A Plea for Earlier Diagnosis and More Radical Surgery"

4:20- 4:40 **Dotter, Charles T., M.D.**
New York, New York
Assistant Professor of Radiology, Cornell University Medical College; Instructor in Medicine, Cornell University Medical College.
and
Steinberg, Israel, M.D.
New York, New York
"Angiocardiography in the Differential Diagnosis and Prognostic Evaluation of Mediastinal Tumors"

EVENING SESSION

Joint Meeting of the Urology, Gynecology and Obstetrics Sections
Grand Ballroom

Presiding: M. Leopold Brodny, M.D., F.A.C.S., F.I.C.S., Boston, Massachusetts
Secretary: Cyril K. Church, M.D., F.I.C.S., New York, New York

Urology

P.M.

8:00- 8:20 **Thompson, Gershom J., M.D., F.A.C.S., F.I.C.S. (Hon.)**
Rochester, Minnesota
"Recent Advances in Prostatic Surgery of Interest to the General Surgeon"

8:10- 8:20 **Rolnick, Harry C., M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
"Urological Literature and the General Surgeon"

8:20- 8:30 **Smith, Parke G., M.D., F.A.C.S.**
Cincinnati, Ohio
"Recent Urological Armamentarium of Interest to the General Surgeon, Especially Renal Arteriography"

8:30- 8:40 **Burns, Edgar, M.D., F.A.C.S.**
New Orleans, Louisiana
"Progress in Pediatric Urology of Interest to the General Surgeon"

8:40- 8:50 **Carroll, Grayson, M.D., F.A.C.S.**
St. Louis, Missouri
"Antibiotics"

Obstetrics and Gynecology

Presiding: Gilbert F. Douglas, M.D., F.A.C.S., F.I.C.S., Birmingham, Alabama

9:00- 9:10 **Kelso Joseph W., M.D., F.A.C.S., F.I.C.S.,** Oklahoma City, Oklahoma
"What's New in Pelvic Surgery"

9:10- 9:20 **Mishell, Daniel R., M.D., F.I.C.S.**
Beverly Hills, California
"Recent Developments in the Study of Sterility"

9:20- 9:30 **Soule, Samuel D., M.D., F.A.C.S.**
St. Louis, Missouri
"Control and Elimination of the Acute Post-Surgical Menopause with Use of Estradiol Pellet Performed at the Time of Surgery"

9:30- 9:40 **Greenblatt, Robert B.**
Augusta, Georgia
"Clinical Application of Vulvar Fluorescence"

Wednesday, September 12

MORNING SESSION

Presiding: George M. Curtis, M.D., F.A.C.S., F.I.C.S. (Hon.), Columbus, Ohio
Secretary: Lloyd Netto, M.D., F.I.C.S.
West Palm Beach, Florida

Symposium: "Acute Intestinal Obstruction"

A.M.

9:00- 9:20 **Gatch, Willis D., M.D., F.A.C.S.**
Indianapolis, Indiana
Professor of Surgery and Head of Department of Surgery, Indiana University School of Medicine.
"The Causes of Death from Bowel Obstruction, with Deductions on Treatment"

9:20- 9:40 **Lockwood, Ira H., M.D., F.I.C.S. (Radiology),** Kansas City, Missouri
Director, Department of Radiology, Research Hospital and Clinic; Consulting Radiologist, Kansas City Municipal Hospital.
"Acute Small Intestinal Obstructions"

9:40-10:00 **Hunt, Claude J., M.D., F.A.C.S., F.I.C.S.,** Kansas City, Missouri
Chief, Hunt Surgical Clinic; Chief Surgeon, Research Hospital and Kansas City General Hospital.
"Acute Intestinal Obstruction in the Small Bowel"

10:00-10:20 **Harris, Franklin I., M.D., F.A.C.S., F.I.C.S.,** San Francisco, California
Chief of Staff and Chief of Department of Surgery, Mount Zion Hospital.
"Indications and Contra-Indications for Intestinal Intubation in Acute Intestinal Obstruction"

10:20-11:00 **Intermission to View Exhibits**

11:00-12:00

Panel Discussion: "Acute Intestinal Obstruction"
Acuff, Herbert, M.D., F.A.C.S., F.I.C.S., Knoxville, Tennessee, *Moderator*
Thorek, Philip, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
Pontius, Guy V., M.D., F.A.C.S., Chicago, Illinois
Noble, Thomas B., Jr., M.D., F.I.C.S., Indianapolis, Indiana

AFTERNOON SESSION

Presiding: R. J. Wilkinson, M.D., F.A.C.S., F.I.C.S., Huntington, West Virginia
Secretary: Andrew W. Bunten, M.D., F.I.C.S., Cheyenne, Wyoming

P.M.

2:00- 2:20 **Appleby, Lyon H., M.D., F.R.C.S. (Eng.), F.R.C.S. (Can.), F.A.C.S., F.I.C.S.,** Vancouver, Canada
Chief Surgeon, St. Paul's Hospital; Consulting Surgeon, Children's Hospital.
"Gas Cysts of the Intestine"

2:20- 2:40 **Thompson, William J., M.D., F.A.C.S., F.I.C.S.,** St. Louis, Missouri
Chief, Surgical Division, De Paul Hospital; Surgical Consultant, St. Louis City Hospital.
"Acute Sigmoid Diverticulitis"

2:40- 3:00 **Bisgard, J. Dewey, M.D., F.A.C.S.**
Omaha, Nebraska
Professor of Surgery, University of Nebraska School of Medicine; Chief of Surgery, Bishop Clarkson Memorial Hospital; Attending Surgeon, Nebraska Methodist and Children's Memorial Hospitals.
"Some Benign Surgical Lesions of the Esophagus"

3:00- 3:20 **Coleman, Everett P., M.D., F.A.C.S., F.I.C.S.,** Canton, Illinois
Chief of Staff, Graham Hospital; Chief Surgeon, Coleman Clinic.
"Late Complications Following Gallbladder Surgery"

3:20- 4:10 **Intermission to View Exhibits**

4:10- 4:30 **Klemme, Roland M., M.D., F.A.C.S., F.I.C.S.,** St. Louis, Missouri
Professor of Surgery, St. Louis University School of Medicine.
"Pain—Chemotherapeutic and Surgical Approach"

4:30- 4:50 **Bartlett, Willard, Jr., M.D., F.A.C.S., F.I.C.S.,** St. Louis, Missouri
Assistant Professor of Clinical Surgery, St. Louis University School of Medicine.
"Obesity in Relation to Ventral Hernia Repair"

Wednesday Evening, September 12

Banquet

Grand Ballroom, Palmer House, Chicago
7:30 P.M.
(Dress Optional)

A. Lawrence Abel, M.S., London; F.R.C.S. (Eng.), F.I.C.S. (Hon.), London, England

Member of Council, Royal College of Surgeons of England; Senior Surgeon, The Princess Beatrice Hospital; Senior Surgeon, The Gordon Hospital for Rectal and Gastro-Enterological Diseases; Surgeon, The Royal Cancer Hospital; President, Metropolitan Counties Branch, British Medical Association; Member of Council, British Medical Association; Hon. Fellow of the American Medical Association; Hon. Fellow of the American Proctologic Society.
"What Is Happening in Britain—Fact and Fiction"

Thursday, September 13

MORNING SESSION

Presiding: Paul F. Doege, M.D., F.A.C.S., F.I.C.S., Marshfield, Wisconsin
Secretary: J. M. de los Reyes, M.D., F.A.C.S., F.I.C.S., Los Angeles, California

A.M.

9:00- 9:20 McRoberts, J. W., M.D., M.C., M.Sc. (Surg.), F.A.C.S., F.I.C.S.
Sheboygan, Wisconsin
Preceptor, University of Wisconsin Medical School; Surgeon, Sheboygan Memorial Hospital.
"Experiences with Acute Pain in the Left Lower Quadrant"

9:20- 9:30 Lans, Hyman S., M.D.
Chicago, Illinois
Resident Surgeon, Cook County Hospital; Research Fellow, Hektoen Institute for Medical Research of the Cook County Hospital; Founder Junior Member, International College of Surgeons.
and
Stein, Irving F., Jr., M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
Associate Professor of Obstetrics and Gynecology, Northwestern University Medical School.
and
Meyer, Karl A., M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
Professor of Surgery, Northwestern University Medical School; Chairman, Department of Surgery, Cook County Hospital.
"The Occurrence and Treatment of Potassium Deficiency in Surgical Patients"

9:30- 9:40 Hobbins, William B., M.D.
Chicago, Illinois
Senior Surgical Resident, Cook County Hospital.
and
Aries, Leon J., M.D., F.A.C.S.
Chicago, Illinois
Assistant Professor of Surgery, Northwestern University Medical School; Professor of Surgery, Cook County Graduate School.
"Incarcerated Diaphragmatic Hernia"

9:40-10:00 Holmgren, Luther E., M.D., F.A.C.S.
Madison, Wisconsin
Surgeon, Jackson Clinic.
"Modern Concepts of Treatment of Varicose Veins"

10:00-10:40 Abel A. Lawrence, M.S., F.R.C.S.
London, England
Senior Surgeon, The Princess Beatrice Hospital; Senior Surgeon, The Gordon Hospital for Rectal and Gastro-Enterological Diseases; Surgeon, The Royal Cancer Hospital.
"Abdomino-Perineal Operation for Carcinoma of the Rectum"

10:40-11:00 Intermission to View Exhibits

11:00-11:20 Good, Louis P., M.D., M.S., F.A.C.S.
Texarkana, Texas
Chief of Staff, Southern Clinic; President of Staff, St. Michael's Hospital.
"A Quick Method for Mobilization of the Intra-Pancreatic Portion of the Common Duct and its Use in Repairing Extensive Defects in the Biliary System"

11:20-12:00 Allen, Harvey S., M.D., F.A.C.S.
Chicago, Illinois
Assistant Professor of Surgery, Northwestern University Medical School; Attending Surgeon, Passavant Memorial and Cook County Hospitals.
"Management of Burns"

AFTERNOON SESSION

Presiding: Karl A. Meyer, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
Secretary: J. O. Morgan, M.D., F.A.C.S., F.I.C.S., Gadsden, Alabama

P.M.

2:00- 2:20 Meyeding, Henry W., M.D., M.S. F.A.C.S., F.I.C.S., Rochester, Minnesota
Professor of Orthopedic Surgery, Mayo Foundation, University of Minnesota Medical School; Senior Consulting Orthopedic Surgeon, Mayo Clinic.
"Some Recent Advances in Surgery of the Bones and Joints"

2:20- 2:30 Hall, Custis Lee, M.D., F.A.C.S., F.I.C.S., Washington, D. C.
Clinical Professor of Surgery, George Washington Medical School; Chief, Department of Orthopedics, Doctors Hospital; Consultant in Orthopedic Surgery, Naval Medical Center.
"Discussion of Paper Presented by Dr. Henry W. Meyerding"

2:30- 2:40 Garceau, George J., M.D., F.I.C.S.
Indianapolis, Indiana
Professor of Orthopedic Surgery, Indiana University Medical School.
"Discussion of Paper Presented by Dr. Henry W. Meyerding"

2:40- 3:10 Intermission to View Exhibits

3:10- 3:30 Kline, Philip S., M.D.
San Antonio, Texas
Former Instructor of Neoplastic Diseases, Hines Hospital, Hines, Illinois; Former Chief, Surgical Service, McCloskey Veterans Administration Center, Temple, Texas.
"The Gastric Cripple Following Total Gastrectomy and a Suggested Solution"

3:30- 3:50 Yanagi, Soichi, M.D., F.I.C.S.
Sapporo, Japan
Professor of Surgery, Hokkaido University College of Medicine.
"Thermal Effects on Wound Healing"

3:50- 4:10 Mayo, Charles W., M.D., M.S., LL.D., F.A.C.S., Rochester, Minnesota
Professor of Surgery, Mayo Foundation, University of Minnesota Medical School; Surgeon, Mayo Clinic.
"Unsuspected Cholelithiasis Discovered at Laparotomy"

4:10- 4:30 Bendani, Prof. Dr. Giuseppe, M.D., F.I.C.S., Rome, Italy
Professor of Clinical Surgery, University of Rome.
(Title to be announced later)

Thursday, September 13

Convocation

Chicago Civic Opera House, Chicago

7:30 Induction of new members

Section Meetings

Orthopedic Section

Monday, September 10

MORNING SESSION

Palmer House, Crystal Room

Presiding: Edward L. Compere, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

Secretary: Carlo Scuderi, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

A.M.

9:30-10:00 **Anderson, Roger, M.D., F.A.C.S., F.I.C.S.,** Seattle, Washington
Senior Consultant, University of Washington School of Medicine; Chief, Orthopedic Staff, King County Hospital; Orthopedic Consultant, U. S. Marine Hospital, Seattle.
"Acrylic Replacements for Head and Neck of the Femur"

10:00-10:30 **Chandler, Fremont A., M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Professor of Orthopedic Surgery, University of Illinois School of Medicine; Senior Attending Orthopedic Surgeon, St. Luke's Hospital, Chicago.
"Muscular Torticollis"

10:30-11:00 **McMaster, Paul E., M.D., F.A.C.S., F.I.C.S.,** Los Angeles, California
Clinical Professor of Orthopedic Surgery, University of Southern California School of Medicine; Senior Orthopedic Consultant, Sawtell (U. S. Veterans') Hospital.
"The Use of Suction Socket Prosthesis for Above-Knee Amputation"

11:00-11:30 **Pipkin, Garrett, M.D., F.A.A.O.S., F.I.C.S.,** Kansas City, Missouri
Attending Orthopedic Surgeon, Kansas City General Hospital and St. Joseph Hospital.
"Intramedullary 'K' Nail Fixation of the Humerus to the Spine of the Scapula for Shoulder Arthrodesis"

11:30-12:00 **Young, H. Herman, M.D., M.S., F.A.C.S.,** Rochester, Minnesota
Assistant Professor of Orthopedic Surgery, The Mayo Foundation; Consulting Orthopedic Surgeon, Mayo Clinic, Colonial and St. Mary's Hospitals.
"Non-Neurologic Lesions Simulating Protruded Intervertebral Disk"

AFTERNOON SESSION

P.M.

2:00- 2:30 **Jewett, Eugene L., M.D., F.A.C.S., F.I.C.S.,** Orlando, Florida
Attending Orthopedic Surgeon, Orange Memorial Hospital, Orlando; Consulting Orthopedic Surgeon, Florida Sanitarium and Hospital, Orlando.

And Co-authors:

Albee, Fred H., Jr., M.D., F.I.C.S.
Powers, Earl J., M.D., F.I.C.S.
Stanford, Freeman DeWitt, M.D.
"Treatment of all Fractures of the Femoral Neck and Trochanteric Region with the Original One-Piece Flange Nail"

2:30- 3:00 **Hall, Custis Lee, M.D., F.A.C.S., F.I.C.S.,** Washington, D. C.
Clinical Professor of Surgery, George Washington Medical School; Chief, Department of Orthopedics, Doctors Hospital; Consultant in Orthopedic Surgery, Naval Medical Center.
"Pelvic Anchor Supersedes Counter-Traction"

3:00- 3:30 **Scuderi, Carlo S., M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Associate Professor of Surgery, University of Illinois School of Medicine; Professor of Surgery, Cook County Graduate School.

and

Ippolito, Anthony, M.D.
"Prevention and Treatment of Non-Union of Supra-Condylar Fractures of the Femur"

3:30- 4:00 **Moe, John H., M.D., F.A.C.S.** Minneapolis, Minnesota
Assistant Clinical Professor of Orthopedic Surgery, University Hospital; Chief, Orthopedic Staff, Minneapolis General Hospital.
"Treatment of Intertrochanteric Fractures. Experiences with Various Methods of Internal Fixation"

4:00- 4:30 **Miller, Donald S., M.D., Ph.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Professor of Orthopedic Surgery, Cook County Graduate School of Medicine; Chairman, Orthopedic Surgery, Chicago Medical School; Attending Surgeon, Cook County Hospital.
"Gangrene of the Extremities, Precipitated by Orthopedic and Traumatic Conditions (in Patients with Normal and Reduced Circulation)"

4:30- 5:00 **Padula, Ralph H., M.D., F.I.C.S.** South Norwalk, Connecticut
Attending Orthopedic Surgeon, Norwalk General Hospital; Director of Orthopedics, St. Joseph's Hospital, Stamford.
"Ruptured Intervertebral Discs, A Five-Year Follow-up of 114 Operated Cases"

Plastic Surgery Section

Tuesday, September 11

Palmer House, Crystal Room

MORNING SESSION

Presiding: Neal Owens, M.D., F.A.C.S., New Orleans, Louisiana

Secretary:

A.M.

9:00- 9:30 **Owens, Neal, M.D., F.A.C.S., F.I.C.S.** New Orleans, Louisiana
Professor of Plastic Surgery, Tulane University of Louisiana School of Medicine; Head of Department, Plastic Surgery, Eye, Ear, Nose and Throat Hospital; Senior Visiting Surgeon in Charge of Plastic Surgery (Tulane Unit), Charity Hospital.
"Chairman's Address"

9:30-10:00 **Sutton, Leon E., M.D., F.A.C.S.** Syracuse, New York
Professor of Clinical Plastic Surgery, Syracuse University College of Medicine; Chief of Plastic Surgery, University and Memorial Hospitals.
"The Treatment of Scar Contractures of the Extremities in Children"

10:00-10:30 **Figi, Frederick A., M.D., F.A.C.S.** Rochester, Minnesota
Professor of Plastic Surgery, Minnesota Gradate School, Mayo Foundation; Head of Section, Plastic Surgery and Laryngology, Mayo Clinic.
"Repair of Postoperative Harelip and Nasal Deformities"

10:30-11:00 **Steffensen, Wallace H., M.D., F.A.C.S., F.I.C.S.,** Grand Rapids, Michigan
Consultant in Plastic Surgery, Blodgett Memorial Hospital, Grand Rapids.
"Further Considerations in the Repair of the Unilateral Cleft Lip"

11:00-11:30 **O'Connor, Gerald Brown, M.D., F.A.C.S.,** San Francisco, California

Clinical Instructor in Surgery, Stanford University School of Medicine.
"The Treacher-Collins Syndrome"

11:30-12:00 **Pickrell, Kenneth, M.D., F.A.C.S.**
Durham, North Carolina
Professor of Plastic and Maxillo-Facial Surgery, Duke University School of Medicine and Duke Hospital, Durham.
"Tumors of the Face and Neck in Children"

12:00-12:30 **Davis, Albert D., D.D.S., M.D., F.A.C.S., San Francisco, California**
Assistant Clinical Professor of Surgery (Plastic), Stanford University School of Medicine.
"The Problem of Melanoma"

AFTERNOON SESSION

P.M.

2:00- 2:30 **Dingman, Reed O., D.D.S., M.D., M.S., F.A.C.S., Ann Arbor, Michigan**
Associate Professor of Oral Surgery and Special Lecturer in Oral and Maxillofacial Surgery, University of Michigan Medical School.
"The Use of Iliac Bone in the Repair of Cranial Defects"

2:30- 3:00 **Adams, William M., M.D., F.A.C.S., F.I.C.S., Memphis, Tennessee**
Assistant Professor of Surgery (Plastic), University of Tennessee College of Medicine; Attending Plastic Surgeon, Baptist Memorial, St. Joseph, Methodist and John Gaston Hospitals, Memphis.
"The Relation of the Plastic Surgeon in the Rehabilitation of the Crippled Child"

3:00- 3:30 **Pierce, George Warren, M.D., F.A.C.S., San Francisco, California**
Chief, Department of Plastic Surgery, St. Francis Hospital; Consulting Plastic Surgeon, Children's, U. S. Marine, Mount Zion, Southern Pacific, and French Hospitals.
"Early Orthodonture in the Cleft Palate Patient"

3:30- 4:00 **Slaughter, Wayne B., M.D.**
Chicago, Illinois
"The Service Problem in Complete Rehabilitation of the Child with Cleft Palate"

4:00- 4:30 **Kemper, John W., D.D.S., M.D., F.A.C.S., Ann Arbor, Michigan**
Professor of Oral Surgery, Dentistry, University of Michigan Medical School; Head of Oral Surgery, University Hospital.
"Retropositioning the Soft Palate by Osteomucoperiosteal Flaps"

4:30- 5:00 **Kitlowski, Edward A., M.D.**
Baltimore, Maryland
Clinical Professor of Plastic Surgery, University of Maryland School of Medicine.
"Reconstruction of Post-traumatic Palates"

5:00- 5:30 **Bethea, John Hardee, M.D.**
Detroit, Michigan
Senior Instructor in Plastic Surgery, Wayne University College of Medicine; Diplomate of American Board of Plastic Surgery.
"Surgical Correction of Congenital Deformities of the Hands"

Section on Ophthalmology and Otorhinolaryngology

Tuesday, September 11

Clinical Meetings

MORNING SESSION—OPHTHALMOLOGY

Chicago Eye, Ear, Nose and Throat Hospital
231 West Washington Street

A.M.

9:00- 9:30 **Surgery, Dry Clinics. Round-Table Discussions.**
Nugent, Oscar B., M.D., F.A.C.S., F.I.C.S.
Professor of Ophthalmology, Chicago Eye, Ear, Nose and Throat College and Staff.
"Surgery of Dislocated Lenses in Children" (Author's Technique) Slides, Dry Clinics and Presentation of Cases.
Wolfe, Otis R., M.D., F.I.C.S.
Marshalltown, Iowa
Chief, Department of Ophthalmology, Deaconess Hospital.
"Marfan's Syndrome"
Perritt, Richard A., M.D., F.I.C.S.
Chicago, Illinois
Associate, Department of Ophthalmology, Northwestern University.

MORNING SESSION—OTORHINOLARYNGOLOGY

Clinic-Research and Educational Hospital
1835 West Polk Street

10:00-12:00 **"What's New in Broncho-Esophagology"**
Holinger, H. Paul, M.D., F.A.C.S.
Chicago, Illinois
Professor, Broncho-Esophagology, Department of Otolaryngology, University of Illinois.

Wednesday, September 12

Palmer House, Crystal Room

MORNING SESSION—OTORHINOLARYNGOLOGY

Presiding: Matthew S. Ersner, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylania
Secretary: Louis Savitt, M.D., F.I.C.S., Chicago, Illinois

A.M.

10:00-10:20 **Goldman, Irving B., M.D., F.A.C.S., F.I.C.S., New York, New York**
Attending Rhinoplastic Surgeon, Mount Sinai Hospital; Attending Otolaryngologist and Rhinoplastic Surgeon, Beckman-Downtown Hospital.
"Maxillo-Facial Triad and Its Correction"

10:30-10:50 **McNaught, Robert Chamberlain, M.D.**
San Francisco, California

11:00-11:20 **Lederer, Francis L., M.D., F.A.C.S.**
Chicago, Illinois
Professor and Head, Department of Otolaryngology Clinic-Research and Educational Hospital, University of Illinois; Otolaryngologist-in-Chief, Illinois Eye and Ear Infirmary.
"The Menacing Spectre of Chronic Aural Suppuration"

11:30-11:50 **Tucker, Gabriel, M.D., F.A.C.S.**
Philadelphia, Pennsylvania
Professor of Broncho-Esophagology and Laryngeal Surgery, Graduate School of Medicine, University of Pennsylvania.
"Tumors of the Larynx"

12:00 Noon **Luncheon Meeting of the Executive Committee**

AFTERNOON SESSION—OPHTHALMOLOGY

Palmer House, Crystal Room

Presiding: Edmund B. Spaeth, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania
Secretary: Clarence H. Albaugh, M.D., F.A.C.S., F.I.C.S., Los Angeles, California

P.M.

2:20- 2:40 **Gailey, Watson, M.D., F.I.C.S.**
Bloomington, Illinois
Chief Surgeon, Gailey Eye Clinic.
"Do's and Don'ts of Cataract Surgery"

Ophthalmology and Otorhinolaryngology Section

Wednesday, September 12

2:50- 3:10 **Berens, Conrad, M.D., F.A.C.S., F.I.C.S.,** New York, New York
pital, University of Illinois; Otolaryngologist-of Research, New York Eye and Ear Infirmary.

and

Girard, Louis J., M.D.
New York, New York
"Secondary Glaucoma" (Surgical Management and with Especial Reference to Cycloelectrolysis)

3:20- 3:40 **Mayer, Leo J., M.D., F.I.C.S.**
St. Louis, Missouri
Ophthalmologist, Jewish Hospital.
"Fundamentals of Eye Surgery"

3:50- 4:10 **Krewson, William E., III, M.D., F.A.C.S.,** Philadelphia, Pennsylvania
Assistant Professor of Ophthalmology, Graduate School, University of Pennsylvania.
"Effect of Inferior Oblique Surgery upon Lateral Deviation"

Thursday, September 13

MORNING SESSION—OPHTHALMOLOGY

Palmer House, Crystal Room

Presiding: Edmund B. Spaeth, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania

Secretary: Richard A. Perritt, M.D., F.I.C.S., Chicago, Illinois

A.M.

10:00-10:20 **(Paper by West Coast Speaker—Retinal Separation.)**

10:30-10:50 **(Paper by Foreign Guest Speaker)**

11:00-12:00 **Study Club: "Interesting Maneuvers in Cataract Surgery"**
Moderator: Paul C. Craig, M.D., F.A.C.S., F.I.C.S., Reading, Pennsylvania
Instructors: Watson Gailey, M.D., F.I.C.S., Bloomington, Illinois
Samuel G. Higgins, M.D., F.I.C.S., Milwaukee, Wisconsin

Ophthalmology and Otorhinolaryngology Section

Thursday Evening, September 13

MORNING SESSION—OTORHINOLARYNGOLOGY

Albert Merritt Billings Hospital
950 East 59th Street

10:00-12:00 **Surgical Clinics**
"The Surgical Management of Carcinoma of the Paranasal Sinuses"
Lindsay, John, M.D., F.A.C.S.
Chicago, Illinois
Chief of Staff, Chicago University Clinic; Professor of Otolaryngology, Chicago University.

and

Schuknecht, Harold F., M.D.
Chicago, Illinois

12:30 **Luncheon—Palmer House**

Presiding: Edmund B. Spaeth, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania

Secretary: Paul C. Craig, M.D., F.A.C.S., F.I.C.S., Reading, Pennsylvania
Luncheon of entire Section in honor of foreign guests. Non-scientific addresses by guests of honor for Ophthalmology and Oto-Rhino-Laryngology.

2:30- 2:45 **Business Meeting of Entire Section**
Palmer House, Crystal Room

Presiding: Edmund B. Spaeth, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania

Secretary: Paul C. Craig, M.D., F.A.C.S., F.I.C.S., Reading, Pennsylvania

AFTERNOON SESSION—OTORHINOLARYNGOLOGY

Presiding: Chevalier L. Jackson, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania

Secretary: Louis Savitt, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

Thursday, September 13

2:45- 3:15 **Study club: On Treatment of Sinus Diseases**
Moderator: Matthew S. Ersner, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania
Instructors: To be announced later.

3:30- 4:00 **(Paper by Foreign Guest Speaker)**

Friday, September 14

Ophthalmology—Clinical Meetings
Northwestern University Medical School
Ward Memorial Building
303 East Chicago Avenue
Dry Clinics. Discussions of Various Phases of Ophthalmology.
Vail, Derrick T., M.D., F.A.C.S.
Chicago, Illinois
Professor and Chairman, Department of Ophthalmology, Northwestern University Medical School and Staff.

Urology Section

Wednesday Morning, September 12

Palmer House, Room 18

Presiding: M. Leopold Brodny, M.D., F.A.C.S., F.I.C.S., Boston, Massachusetts

Secretary: Cyril Klock Church, M.D., F.I.C.S., New York, New York

A.M.

9:00- 9:20 **Flocks, Rubin H., M.D., F.A.C.S.**
Iowa City, Iowa
Professor and Head, Department of Urology, State University of Iowa College of Medicine; Chief Urologist, University Hospitals.
"Carcinoma of the Prostate"

9:20- 9:40 **McCrea, Lowrain E., M.D., F.A.C.S., F.I.C.S.,** Philadelphia, Pennsylvania
Clinical Professor of Urology, Temple University School of Medicine; Attending Urologist, Philadelphia General Hospital.
"The Importance of Nerve Supply of the Urinary Bladder in Surgery of the Recto-Sigmoid"

9:40-10:00 **de la Peña, Alfonso, Prof. Dr., F.I.C.S.,** Madrid, Spain
Professor of Urology, Faculty of Medicine, University of Madrid.
"Phlebographic Studies of the Pelvic Plexus on the Living Subject"

10:00-10:40 **Intermission to View Exhibits**

10:40-11:00 **Tracy, Edward M., M.D.**
Buffalo, New York
"Steroid Hormones in Carcinoma of the Prostate"

11:00-11:20 **Nicely, Eugene Park, M.D., F.I.C.S.**
Knoxville, Tennessee
Chief of Urology, St. Mary's Memorial Hospital.
"Urological Symptoms Relieved by

Postural Correction"

11:20 **Discussion—Moderator:**
George H. Ewell, M.D., F.I.C.S.
Madison, Wisconsin

Obstetrics and Gynecology Section

Wednesday Morning, September 12

Palmer House, Room 14

A.M.

9:00- 9:15 **Cohen, M. Stanley, M.D., F.A.C.S., F.I.C.S.,** Philadelphia, Pennsylvania
Associate, Department of Obstetrics and Gynecology, Temple University Medical School; Assistant Obstetrician and Gynecologist, Jewish Hospital; Associate Obstetrician and Gynecologist, Temple University Hospital.
"The Practical Application of Analgesia and Anesthesia in Obstetrics"

9:15- 9:30 **Galloway, Charles E., M.D., F.A.C.S.**
Evanston, Illinois
Former Assistant Professor of Obstetrics and Gynecology, Northwestern University Medical School; Obstetrician and Gynecologist, Evanston Hospital.
"The Cervix in Pregnancy"

9:30 9:45 **Daniel, Walter W., M.D., F.I.C.S.**
Atlanta, Georgia
Former Instructor, Emory University School of Medicine.
and
Inman, John, M.D.
"Rupture of the Pregnant Uterus"

9:45-10:00 **Hahn, George A., M.D., F.A.C.S.**
Philadelphia, Pennsylvania
Associate in Obstetrics and Gynecology, Jefferson Medical College.
"Uterine Malignancy—Method of Treatment"

10:00-10:45 **Intermission to View Exhibits**

10:45-11:00 **Rucker, M. Pierce, M.D., LL.D.**
Richmond, Virginia
Emeritus Obstetrician-in-Chief, Johnston-Willis Hospital.
"Obstetric Difficulties"

11:00-11:15 **Andrews, Gould, M.D.**
Oak Ridge, Tennessee
Assistant Professor of Medicine, Medical College of Alabama; Chief of Clinical Service, Oak Ridge Institute of Nuclear Studies.
"Therapeutic Uses of Radioisotopes"

11:15-11:30 **Douglas, Gilbert F., M.D., F.A.C.S., F.I.C.S.,** Birmingham, Alabama
Associate Professor of Gynecology, Medical College of Alabama.
(Chairman's Address) "Uterine Bleeding—Vision of Joy or a Sign of Woe"

11:30-11:45 **Ayre, James E., M.D.**
Montreal, Canada
"Cancer Detection"

Occupational Surgery Section

Thursday Afternoon, September 13

Palmer House, Room 14

P.M.

2:00- 2:30 **Aitken, Alexander P., M.D., F.A.C.S.**
Boston, Massachusetts
Instructor in Orthopedic Surgery, Tufts College Medical School.
"End Results of Ruptured Intervertebral Discs in Industry"

2:30- 3:00 **Kelikian, Hampar, M.D., F.A.C.S., F.I.C.S.,** Chicago, Illinois
Assistant Professor of Bone and Joint Surgery, Northwestern University Medical School; Senior Orthopedic Surgeon, Wesley Memorial Hospital; Attending Orthopedic Surgeon, Cook County Hospital.
"Arthritic Occupational Disabilities and their Treatment by Surgery"

3:00- 3:30 **Intermission to View Exhibits**

3:30- 4:00 **Lewis, Elbert K., M.D., F.R.S.N.A., F.I.C.S. (Radiology),** Chicago, Illinois
Instructor in Radiology, Northwestern University Medical School; Radiologist, St. Bernard's Hospital.
"Accessory Bones and Anomalies often Mistaken for Fractures"

4:00- 4:30 **Lambert, Claude, N., M.D., M.S.**
Chicago, Illinois
Associate Professor of Orthopedic Surgery, University of Illinois College of Medicine; Attending Orthopedic Surgeon, St. Luke's Hospital.
"The Relationship of Occupational Strains to the 'Disc Syndrome'"

4:30- 5:00 **Burkholder, Theodore M., M.D., F.A.C.S.,** Chicago, Illinois
Attending Urologist, Illinois Central, Evangelical and Englewood Hospitals.
"Occupational Injuries to the Male Urethra"

Joint Meeting of Obstetrical and Gynecological Section with Urological Section

Wednesday Afternoon, September 12

Meeting Dedicated to Dr. Guy L. Hunner

Presiding: George H. Ewell, M.D., F.I.C.S., Madison, Wisconsin

P.M.

2:00- 2:15 **Guy L. Hunner, M.D., F.A.C.S.**
Baltimore, Maryland
"A Few Reminiscences of One Who Has Worked in Close Association with Gynecologists, Obstetricians, and Urologists for More than a Half-Century."

2:15- 2:30 **Howard W. Jones, Jr., M.D.**
Baltimore, Maryland
"Gynecological Aspects of Urology."

Symposium

"The Renal Factor in Pregnancy—Non-Toxemic Hypertension of Pregnancy."

2:30- 2:45 Gynecological Viewpoint: **Wynne Silbernagel, M. D.,** Columbus, Ohio

2:45- 3:00 Urological Viewpoint: **John W. Ferrin, M.D.,** Chicago, Illinois

3:00- 3:10 **Discussants:**
Edwin J. Decosta, M.D.
Chicago, Illinois
Walter J. Reich, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

3:10- 3:20 **General Discussion**

Symposium

"Stress Incontinence in the Female."

3:20- 3:35 Gynecological Approaches: **Charles B. Kelley M.D., F.A.C.S., F.I.C.S.** Jersey City, New Jersey

3:35- 3:50 Urological Approaches: **Herbert E. Landes, M.D., F.A.C.S.,** Chicago

3:50- 4:00 **Discussants:**

M. Leopold Brodney, M.D., F.A.C.S., F.I.C.S., Boston, Massachusetts
To be announced

Symposium

"Management of the Surgical Traumatized Ureter."

4:10- 4:25 Urological Factor: **Alfonso Davalos, M.D.,** New York City, New York

4:25- 4:40 Gynecological Factor: To be announced

4:40- 4:50 **Discussants:**

J. P. Greenhill, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
To be announced

4:50- 5:00 **General Discussion**

Film Forum and Scientific Motion Picture Program

PHILIP THOREK, M.D., F.A.C.S., F.I.C.S., CHAIRMAN

A Film Forum will be presented, in which four outstanding surgical motion pictures will be exhibited, with comments by the respective authors. There will be a general discussion and question period open to any surgeon. All are invited to participate.

TENTATIVE SURGICAL MOTION PICTURE PROGRAM

September 10 through 13, 1951

Philip Thorek, M.D., F.A.C.S., F.I.C.S., Chairman
Ankell M. Vaughn, M.D., F.A.C.S., F.I.C.S.
Jerome J. Moses, M.D., F.I.C.S.
Adolph M. Maller, M.D., A.I.C.S.

Subtotal Thyroidectomy for Primary Hyperthyroidism .....Frank Lahey

Complete Exenteration of the Pelvis..... ..... Alexander Brunschwig

Ureterosigmoid Anastomosis by Direct Elliptical Connection.....Reed M. Nesbit

Parotid Tumors.....Raymond McNealy

Splenorenal Anastomosis.....Louis M. Rousellot

Excision Anal Fissure, Fistulectomy and Hemorrhoidectomy .....Dean Swinton

Abdominoperineal Resection.....Richard Cattell

Coversion of the Auricular Appendage into a Leak-Proof Valve Tube for Intracardiac Surgery.....Samuel A. Thompson

Crushing Injuries to the Thorax..... .....Howard K. Gray

Inthrahepatic Cholangiojejunostomy with Partial Hepatectomy Following Obstruction to the Bile Ducts.....Philip Thorek

Surgical Resection of Thymic Tumors for Myasthenia Gravis.....Alfred Goldman

Esophageal Diverticulectomy ....Conrad J. Baumgartner

Surgical Approaches to the Knee Joint..... .....Veterans Administration (U.S.A.)

Surgical Treatment of Carotid Body Sensitivity in Man...U. S. Dept. of Pathology (Army)

Hernia of the Lung.....Lawrence M. Shefts

Horseshoe Kidney.....C. M. Stewart

Ligation of the Vena Cava and Ovarian Vessels for Suppurative Pelvic Thrombophlebitis... ..... Conrad Collins

Uterine Cancer: The Problem of Early Diagnosis.....American Cancer Society

The Technic of Cholecystectomy.Kenneth Sawyer

Pyloromyotomy for Infantile Pyloric Stenosis .....John Madden

Coniotomy in the Treatment of Congenital Glaucoma .....Harold Scheie

Ulnar Nerve and Soft Tissue Defect Simultaneous Repair in the Forearm..... .....U. S. Army Dept. of Pathology

Cyst of the Urachus.....Norman O'Neill

Suprapubic Prostatectomy with Primary Bladder Closure.....George Ewell and Harold Bruskewitz

Tantalum Cranioplasty Repair.....Ralph Stuck

EDITOR'S NOTE: *Both the Assembly Program and the Motion Picture Program as here presented are in their preliminary form. Final programs will appear in the August issue of the Journal.*

New Books

Lumbar Puncture and Spinal Analgesia. By R. R. Macintosh. Baltimore: Williams and Wilkins Company, 1951. Pp. 149, with 111 illustrations.

This book was written with four purposes in mind. First, as a guide for one who is setting out on his first lumbar puncture and use of spinal anesthetics; second, to disclose the essentials of the subject in order to prevent those who are tempted to administer spinal anesthetics from being led into difficulties by their lack of knowledge of the basic principles; third, to clear up certain obscure aspects of spinal analgesia, and fourth, because the illustrations have been recorded clearly and with decision, to help those who have no opportunity for dissecting this unfamiliar region.

The book is not confined strictly to practical aspects of lumbar puncture and spinal analgesia, it also includes a few academic points likely to interest those studying for examinations.

The illustrations, which, in the main, are original and diagramatic, disclose the exact structures involved in lumbar puncture. No extraneous structures are depicted. The subject material is up to date, and the reader is not burdened with controversial matter.

The book is printed in large type, which makes for easier reading. Though the volume is small, the material covered is entirely adequate. It is recommended not only for the beginner but as a general review for those who are well acquainted with the subject of spinal analgesia.

The Hebrew Medical Journal. Edited by Moses Einhorn. New York, Volume 1, 1951.

The appearance of the spring issue of The Hebrew Medical Journal (Harofé Haivri) inaugurates the twenty-fourth successful year of its publication under the editorship of Moses Einhorn, M.D. Written in Hebrew, with English summaries, the Journal is a contribution to the development of the Hebrew medical literature, and thus aids the newly established Hebrew University Medical School in Jerusalem.

In the medical section, among the articles of interest are: "Brain Tumors—Prognosis Based on Their Morphology," by Dr. Joseph H. Globus of Mt. Sinai Hospital; "The Modern Approach to the Management of the Failing Heart," by Dr. A. B. Rimmerman of Chicago, and "Modern Concepts in the Diagnosis and Treatment of Marital Infertility," by Dr. Abner I. Weisman of New York City.

Under the heading of "Israel and Health," Dr. Chaim Berlin discusses "Venereal Diseases in Israel," and "The Care of Deaf-Mutes in Israel" is presented by Dr. Mordecai Hexter.

In the section "Old Hebrew Medical Manuscripts" Dr. Zussmann Muntner of Jerusalem presents "Persion Medicine and Its Relation to Jewish and Other Medical Science—Commemorating the Millennium of Avicenna," and Dr. Leon Nemoy of Yale University writes on "Medical Material in the Code of Karaite Law of Elijah Bashyatchi."

The editorial office of this journal is located at 983 Park Avenue, New York 28, N. Y.

Light Therapy. By Richard Kovacs. Springfield, Ill.: Charles C. Thomas, Publisher, 1950. Pp. 112, with 28 illustrations. (A monograph in the series **American Lectures in Physical Medicine.**)

Physical therapy, especially in the forms of light and heat, is here presented briefly but comprehensively. The author points out that, in view of recent advances in knowledge and technic, not only the physiotherapist but the surgeon, the pediatrician, the internist, the dermatologist and many other special medical fields have need to keep abreast of current knowledge.

A condensed history of light therapy is provided as a background, after which there is a section on the physics of radiant energy. This is followed by chapters on infrared, luminous and ultraviolet radiation. Heliotherapy in general is examined as to technic and results.

The monograph is illustrated with photographs, charts and line drawings, with technical and statistical tables where there is need. Many of the photographs and drawings depict the necessary apparatus, often during use in the hospital or sanatarium. Needless to say, this is an important addition to such a work. In combination with a text of great clarity and practicality, it

makes for a presentation that will repay any reader's interest.

A Review of Medicine. By Benjamin Boshes. Chicago: Northwestern University Press, 1951. 6th ed. Pp. 814.

The faculty of the Northwestern University Medical School presents a new edition of this standard reference book to which six new chapters, four entire new sections have been added, and in which eleven new drugs or classes of drugs are discussed. The new chapters deal with tuberculosis, irradiation, psychosomatic medicine, war surgery, cancer, and the use of the antibiotics and sulfonamides; the new sections, with diseases of the liver, diseases of the blood vessels, gangrene and injuries to the spinal cord. The new drugs include the antihistaminics, the antibiotics, the sulfonamide compounds, the radioactive substances, thiouracil, tridione, phenurone, mesantoin, folic acid, nitrogen mustard and dicumarol.

The entire volume has been not only revised but rewritten. But the convenience of its arrangement is retained. Each entity is dealt with in synoptic style, giving the reader at once its definition, its cause (if known), its symptoms and signs, its diagnostic criteria, its treatment and its prognosis. This is one of the best-organized books of its kind now available to doctors.

Surgical Techniques—Thoracic Surgery, (Techniche Chirurgiche — Chirurgia Toracica). By Raffaele Paolucci di Valmaggiore. Bologna: Licinio Cappelli, 1950. Pp. 259; profusely illustrated.

This excellent volume by one of the outstanding contemporary surgeons, who is head of the Department of Surgery of the Royal University of Rome, Italy, Prof. Raffaele Paolucci, and his co-workers, is an excellent contribution to contemporary surgical literature. Those who know the versatility, brilliance and didactic abilities of Paolucci will delight in the possession of this volume, particularly those who read Italian. In fact, the work calls for translation into other languages.

The text opens with a discussion of the preparation of the patient for surgical procedures of the chest and modern methods of anesthesia for surgery of the thorax (Brancadoro). The subject of introthoracic cancer of the esophagus (Ruggieri), the indications for operation, the preparation of the patient, anesthesia and the various technics used in connection with this procedure are excellently described and adequately illustrated. This chapter is followed by a description of total gastrectomy by the transthoracic-transdiaphragmatic route (Marcozzi). The pattern of thoroughness exemplified in the preceding chapter is followed here, and is succeeded by a discussion of modern trends in the treatment of acute empyema (Fojanini) and echinococcosis of the lung (Bocchetti), followed by an excellent chapter on bronchoscopy and bronchial aspiration (Tosatti) and a supplementary chapter on bronchography (Giacobini). There is also a description of the technic of angiocardiography (Giacobini and Simonetti).

Special chapters are devoted to the treatment of the bronchial stump in pneumonectomy and lobectomy (Fojanini), to be concluded by a description of partial superior thoracoplasty and extrafascial apicolysis according to Semb's technic (Ruggieri).

A careful analysis of this fine work will impress one with its value and its clarity of presentation. Perhaps it would be well to point out that the statement of Brancadoro, crediting Evarts Graham of St. Louis with the first pneumonectomy, should be corrected. The first pneumonectomy was performed by Rudolph Nissen some years prior to Graham's report. Graham resorted to the technic described by Nissen. Except for this historical fact, the technical details are excellently presented and ably illustrated.

As a whole, the work exemplifies the masterly teachings of Paolucci and the training his assistants receive under his guidance. The work is particularly characterized by thoroughness, by statement of facts and by the elimination of verbosity. It will serve students, mature surgeons and specialists as a ready reference book, explaining modern aspects of surgery of the thorax, which is so rapidly coming to the fore. For a long time this was virtually a forbidden territory and it is still a fertile field for accomplishment and exploration.

Abstracts from Current Literature

Neomycin: Results of Clinical Use in Ten Cases. Duncan, G. G., Clancy, C. F., Wolgamot, J. R., and Beidleman, B., J.A.M.A. 145:75, 1951.

Neomycin, one of the newer antibiotics, is relatively thermostabile and is active against numerous grampositive and gramnegative organisms. It is active also against streptomycin-resistant organisms and has in vitro activity against different forms of Mycobacterium tuberculosis, in some cases showing greater activity than streptomycin. Waksman and Lechevalier are cited as emphasizing that before a new antimocrobial agent can be considered to have chemotherapeutic potentialities it must be less favorable to the development of resistance among organisms and less toxic and more potent, alone or in combination with other agents, than available antibiotic agents. Ten clinical cases are reported in which neomycin was used and in which these criteria were fulfilled. Each patient had a bacterial infection due to one or more pathogenic organisms which were completely or moderately resistant to penicillin, aureomycin, chloramphenicol and streptomycin, while all but one (a Pseudomonas) were sensitive to neomycin. It was markedly effective in eradicating sensitive organisms from the blood and urinary tract (for which latter system it was chiefly used) and significantly in no case in which the organism was eradicated did it return after cessation of therapy. Brief resumes of the ten cases are presented.

RAYMOND GREEN, M.D.

The Surgical Treatment of Duodenal, Gastric and Anastomotic Ulcer with Especial Reference to Vagus Resection. Trimble, I. R., and Lynn, D. H., International Abst. of Surg. 90:105-132, 1950.

In this beautifully prepared collective review the authors not only present the surgical treatment of duodenal, gastric and anastomotic ulcers but discuss in a concise fashion the innervation of the stomach and related viscera and their activities in digestion. The intrinsic and extrinsic nerve supply to the stomach, gallbladder and pancreas is presented in a clear, concise fashion, so that the reader is readily able to determine why vagus resection is often ineffectual. The physiology of the stomach and the effects of vagus resection upon it are described, as are the side effects upon the physiologic functions of the gallbladder and pancreas. The pronounced alterations in physiologic function of the stomach, gallbladder, pancreas, and small intestine produced by vagus resection are presented in some detail. The reduction in the flow of gastric juice and in the acidity of this juice is stressed.

The basis for vagus resection is the premise that chronic peptic ulcer is a systemic disturbance, the underlying mechanism being related to parasympathetic overbalance. This being the case, division of the vagus fibers, by releasing the stomach from neurogenic influences, should reduce the excessive secretory motor and vascular activities which are thought to cause the ulcertative process. The validity of this concept is challenged by many historical, anatomic, and physiologic observations. Exner performed vagus resection in 1907 for chronic peptic ulcer. After a period of popularity in Europe, the method was abandoned by 1925. The anatomic observation that parasympathetic impulses are on some occasions conveyed to the stomach over pathways other than the vagi would result in the failure of even a complete vagus resection to accomplish its objective. In addition, it has been demonstrated that gastric activities tend in time to return toward the normal level after vagus resection. This would indicate that the results of this operation may well be temporary. On physiologic grounds, one could not reasonably expect a vagus resection to promote healing in an ulcer that was not caused or related to parasympathetic overflow.

Summarizing the material presented in this exhaustive paper, the authors express the opinion that more time must elapse before a final conclusion as to the effectiveness of vagus resection can be drawn. On the basis of what is known at present the following conclusions appear to be warranted: 1. Resection of the vagus nerves has not proved to be the complete surgical remedy for duodenal, gastric and anastomotic ulcers, as was originally thought. 2. Vagus resection is more effective when supplemented by gastric drainage than when done as a single

procedure. 3. Adequate gastric resection with removal of 70 to 80 per cent of the stomach, including the antral mucosa, appears to be the operation of choice. 4. Vagus resection, gastric drainage or both should be reserved for patients for whom subtotal gastrectomy is contraindicated.

The group for whom subtotal gastrectomy is contraindicated and for whom vagus resection with or without gastroenterostomy should be the procedure of choice consists of patients with the following conditions:

1. An anastomotic ulcer following extensive subtotal gastrectomy.
2. An adherent ulcer in the region of the ampulla of Vater when an exclusion operation is unsuitable.
3. An ulcer high on the lesser curvature for which more radical surgical treatment is not indicated.
4. A duodenal ulcer in a young, emotionally unstable person presenting a nutritional problem.
5. Partial gastrectomy and vagus resection in patients with recurrent massive gastroduodenal hemorrhage or a history of several episodes of acute perforation.

An extensive bibliography is included.

M. O. CANTOR, M.D.

Surgical Treatment of Varicocele. Alexander, R., Am. J. Surg. 2:330, 1950.

A brief outline of the gross anatomy encountered in varicocele is given. The pitfalls of varicocelectomy, such as hemorrhage, atrophy of testes, and hydrocele are said to have caused many urologists and surgeons to abandon the operation. Ivanissevich described the venous drainage system of the testes and recommended, some twenty years ago, high ligation of the internal spermatic vein as the treatment of choice for painful varicoceles. Later Javert and Clark advocated ligation of the internal spermatic vein for the cure of this entity.

When the circulation of the testes and surrounding regions is thoroughly understood, the logical operation is to relieve the backpressure caused by the anatomic weakness of the internal spermatic vein by high ligation of this vessel above the point of its anastamosis with the various components of the venous system in the pampiniform plexus.

An incision is made as for a herniorrhaphy, except that the length rarely needs to be more than 6 cm. unless a concurrent hernia is present. If an unsuspected hernia is encountered, extension of the incision will be necessary. The aponeurosis of the external oblique muscle is incised down to or through the external inguinal ring, being carried laterally to expose the abdominal inguinal ring. The cremasteric muscle and fascia are incised longitudinally at the proximal end of the inguinal canal, and the internal spermatic vein is dissected free for a distance of about 5 cm. The vein is securely ligated at the internal ring and at the distal portion of the dissection. The vein is excised between the ligatures, the proximal end being allowed to retract into the abdominal cavity. In some instances the internal spermatic vein is formed inside the abdominal inguinal ring and there are two branches instead of a single vein in the cord at the lateral end of the inguinal canal. Both veins are ligated in such cases.

Postoperatively the patient should wear a scrotal support for about one week. Bathroom privileges are allowed on the first postoperative day, followed by gradual ambulation. Hospitalization is rarely necessary after the fourth day, and the high incidence of postoperative complications is reduced. Herniorrhaphy is performed simultaneously if necessary.

J. U. REAVES, M.D.

Dolicho - Mega - Artery. Leger, Lucien, and Cerbonnet, Georges, La Presse Medicale 58:951, 1950.

This is the report of a case of dolichomega-artery. A tumor mass was observed in the right cervicolateral area and appeared to originate from a branch of the external carotid artery. Arteriographic studies failed to show any opacity, nor was there any suggestion of aneurysm. At operation the dilatation was observed to include the common carotid, the external carotid and the superior thyroid arteries. Histologic study revealed lesions of endarteritis sclerosis of the muscular coat and thickening of the adventitia. No inflammatory reaction was present. The loop of the thyroid artery only was resected, a surprisingly successful procedure. Two months later the arteriograph failed to reveal any opacity of the vessels.

In the author's opinion this case is analogous to that reported by Leriche in 1927, who gave the lesion its name. The condition is considered quite rare.

Surgical Complications of Congenital Anomalies of the Umbilical Region. Arnheim, E. E., Surg., Gynec. & Obst. 91 : 71-80, 1950.

The author describes the surgical treatment of two surgically complicated congenital anomalies of the umbilical region. Both patients were successfully treated, which indicates the advances made in surgical treatment and preoperative and postoperative care, since the mortality rate was formerly very high.

The first patient had a large omphalocele which had ruptured during delivery. As a result, a large mass of loops of reddened intestine lay on the abdominal wall, coming through a large opening in the sac of the omphalocele. Operation was performed two hours after delivery. At this time resection of the ileum and side-to-side anastomosis were necessary because of obstruction of the bowel caused by the large mass of a Meckel's diverticulum. The defect in the abdominal wall was closed. The infant was kept in an incubator supplied with oxygen. A Levine tube was inserted for gastroduodenal suction. Penicillin was given. A second operation was performed five days after the first for intestinal obstruction. The site of the anastomosis was observed to be dull and reddened. The ileum proximal to the anastomosis was dilated, whereas the portion distal to the anastomosis was collapsed. The anastomotic site was resected and a second side-to-side anastomosis performed. The patient made an uneventful recovery.

The second patient, 1 month old, presented a prolapse of the ileum through a patent omphalomesenteric duct. The ileum to each side and including the patent duct was excised. A side-to-side anastomosis was then done. The patient recovered uneventfuliy.

A brief but adequate review of the literature relative to each of these anomalies precedes the case report.

M. O. CANTOR, M.D.

Lipotropic Factors in the Treatment of Cirrhosis. Williams, J. O.: Cayer, D., and Cornatzer, W. E.: Southern M. J. 44:369, 1951.

The authors discuss a method for testing the function of the liver in the formation of phospholipids. By means of repeated needle biopsies of the liver and measurements of phospholipids entering the blood stream through the liver with the use of radioactive p^{32} they have investigated the relation between fatty infiltration of the liver and a deficiency of lipotropic factors; also, the effect of treatment with lipotropic factors on the rate of phospholipid turnover and the correlation of phospholipid turnover with the amount of neutral fat in the liver.

Twenty patients with evidence of advanced hepatic disease were studied. Seventeen were male and 3 female; the youngest was 10 years old and the oldest 56. On admission, 8 were jaundiced and 11 had ascites. All had palpable spleens.

The authors' results showed that the use of radioactive phosphorus and serial needle biopsies provides a means of studying the effects of lipotropic agents on phospholipid turnover and on the removal of neutral fat from the liver. In patients with fatty infiltration of the liver the rate of phospholipid turnover after a large dose of choline or methionine is significantly higher at the onset of treatment than it is two months later, when clinical improvement has taken place and the amount of fat in the liver has decreased. In cases of hepatomegaly with necrosis and scarring without fat, the rate of phospholipid turnover is not increased after the large dose of lipotropic material.

HOWARD S. STERN, M.D.

Telescopic Pancreaticojejunostomy. Binkley, J. S.: Cancer 4:226, 1951.

The author describes a single case of carcinoma of the head of the pancreas in which internal pancreatic drainage was successfully established by means of an ingeniously devised "telescopic" end-to-end pancreaticojejunostomy.

He states logically that preservation of pancreatic drainage into the jejunum offers the patient his best chance to regain nutritional and metabolic balance, particularly if done proximal to the other hook-ups. In the presence of malignant lesions of the pancreas only time will tell whether anything less than total pancreatectomy is justified.

For in benign lesions of the pancreas and carcinoma of the ampulla of Vater, partial pancreatectomy is the procedure of choice, combined with a safe intestinal implantation of the pancreatic stump.

This article provides a concentrated review of this entire problem and describes in detail the author's technic of telescopic end-to-end pancreaticojejunostomy.

THOMAS WILENSKY, M.D.

A Rational Approach to Cancer of the Stomach. Donald, James, and Donald, John: J. Med. Assoc. Alabama 20: 348, 1951.

The poor results of therapy for cancer of the stomach are due in a large measure to extreme difficulty in making an early diagnosis and to failure of the surgeon to be sufficiently radical. In order to make the diagnosis earlier one must suspect cancer of the stomach in any patient with vague indigestion who is over 40 years of age. Such a patient demands prompt and thorough fluroscopic and roentgen examination of the stomach. A gastric examination by a self-appointed roentgenologist with outmoded equipment cannot be expected to approach the 95 per cent average of the good roentgenologist. Study of gastric acidity, gastroscopic investigation and Papanicoleau study of secretions may afford added academic precision as to whether the lesion is malignant.

The second factor of greatest importance in early diagnosis is the attitude of the profession toward gastric ulcer. Every gastric ulcer must be considered cancer until proved otherwise. Often the roentgenologist, the gastroscopist and even the pathologist with the lesion in his hand cannot differentiate them. One cannot afford to temporize with patients in whom gastric ulcers develop after the age of 40. Gastric resection should be advised as soon as the diagnosis is made. This attitude is not radical; with subtotal gastrectomy the mortality rate should not exceed 1 per cent, and the operation is not crippling. The probability of excellent health is greater than 80 per cent, and the likelihood of recurrent ulceration is not greater than 1 per cent.

Two anatomic and pathologic considerations are important. These are the distribution of regional lymph nodes and the tendency for cancer to extend intramurally beyond the gross tumor. The regional nodes usually receive metastases of cancer of the stomach. Involvement of a node by cancer cannot be excluded grossly. Limited resection has no place in the curative treatment of cancer of the stomach.

The mortality of total gastrectomy does not exceed 10 per cent. If total gastrectomy shows a substantial increase in the chance of cure, any rational patient will happily accept some physiologic disturbance. The physiologic disturbance is not incompatible with a comfortable, productive life.

A. H. LETTON, M.D.

Appraisal of Vagotomy for Peptic Ulcer After Seven Years. Dragstedt, L. R., and Woodward, E.: J.A.M.A. 145:795, 1951.

The authors present a detailed and complete discussion of the late results of an operation devised by the senior author. In a series of 509 vagotomies, which were followed up for periods up to seven years, their conclusions are as follows:

"1. Complete vagotomy by a transabdominal, transdiaphragmatic approach, combined with a gastroenterostomy of small size, is a relatively safe, efficient and practical method of surgical treatment and should replace subtotal gastrectomy as the initial, definitive surgical treatment for duodenal, gastrojejunal and certain esophageal ulcers.

2. The complications of vagotomy operations for peptic ulcer are chiefly due to motor disturbances in the stomach, are for the most part trivial and self limited and can be controlled or eliminated entirely by gastroenterostomy and adequate postoperative decompression of the stomach.

3. Persistence, or recurrence, of duodenal or gastrojejunal ulcer is almost invariably due to incomplete vagotomy as evidenced by physiological tests.

4. Deviation of the alkaline juices of the duodenum away from the region of the anastomosis by enteroenterostomy in association with gastroenterostomy for duodenal ulcer is a mistake and can be expected to lead to the development of a stoma ulcer in spite of a complete vagotomy.

5. The data of this study support the concept of duodenal ulcer as of psychosomatic or nervous origin."

HOWARD S. STERN, M.D.

Colonic Replacement of the Stomach. Moroney, J.: Lancet 1:993-996, 1951.

In an effort to restore the food canal to continuity after partial gastrectomy and to provide a gastric storage mechanism, the author has devised an interesting method. A free loop of transverse colon is anastomosed to the duodenum on the one side and the lower end of the cut stomach on the other.

Twenty-two patients were subjected to this operative procedure without a death. Twenty of these patients were operated upon because of paptic ulcer and 2 because of postgastrectomy vomiting.

The longest postoperative follow-up period was five months.

M. O. CANTOR, M.D.

Gas Cysts of the Intestines. Dale, A. W., and Pearse, H. E., Surg., Gynec. & Obst. S.G.&O. 90:215, 1950.

Gas cysts of the intestines (pneumatosis intestinalis, emphysematosis, pneumatosis cystoides intestinorum, etc.) are relatively rare in man. Dale and Pearse of Rochester, New York, report 2 additional cases.

The cause of gas cysts in the intestines is obscure. Bacterial and neoplastic factors have been suggested but is improbable. It may be that gas is mechanically forced from the intestinal tract into the bowel wall and adjacent tissues through the lymphatics, as many of these cases have a mechanical factor. The disease is not uncommon in pigs with a dietary deficiency. In cases of intestinal obstruction the patients are often malnourished. It appears probable that the deficiency state is related to the development of the cysts in man.

Microscopically the cysts appear as empty spaces surrounded by a wall consisting either of connective tissues or of endothelium-like cell lining. Multinucleated giant cells may lie in the wall as well as nearby. Acute inflammatory cells and small round cell infiltration and fibrosis of the wall have been noted.

Gas cysts are often observed incidently at autopsy or at operation for pyloric stenosis. One case has been reported in which a palpable abdominal mass proved to consist of an inflamed gas cyst rather than a tumor. Relief of the underlying cause of the cyst has usually been the primary purpose of operation. Resection should be reserved for an occasional case in which evidence of inflammation or adhesions is present and in which intestinal obstruction may occur later. It is impractical to attempt local treatment of the cysts, as they may be tiny and there may be thousands.

The first case reported is that of a patient with pyloric stenosis, secondary to chronic peptic ulceration. A posterior gastrojejunostomy was performed to relieve the obstruction. The serosa of the terminal portion of the ileum was infiltrated by many gas cysts. This was resected and the continuity reestablished by end-to-end anastomosis.

The second case is that of a white man aged 35; an inoperable adenocarcinoma of the stomach was found on laparotomy. This patient died five weeks after the operation and at autopsy showed carcinoma of the stomach with metastases to the regional lymph nodes, gallbladder, liver, lungs, left adrenal gland and retroperitoneal lymph nodes. Throughout the jejunum and all but the terminal parts of the ileum gas cysts gave the small bowel a marked foamy, emphysematous mucosal pattern.

H. J. ROSEVEAR, M.D.

Duration of Life in Untreated Cancer. Shimkin, M.: Cancer 1:1, 1951.

The ultimate result in the treatment of cancer is the permanent eradication of the neoplastic growth and recovery of the patient. When a cure is not possible, the goal is retardation of the growth and prolongation of useful and comfortable life. For proper evaluation of the latter type of treatment it is important to understand the behavior of cancer of various organs in the untreated patient. The author presents a study which presents data on patients with untreated cancer of various organs in an attempt to determine the duration of life from clinical onset to death.

This material was accumulated from case histories, medical records and death records. The shortest period of survival was associated with esophageal lesions, with 50 per cent of the patients being dead after seven months; the longest was associated with cancer of the breast, with 50 per cent dead after twenty-six months. The list, in order of duration of life from onset to death (longest first) follows: breast, rectum, cervix, oral, stomach, larynx and esophagus.

Spontaneous regressions occur particularly in cases of lymphoma, the incidence being as high as 10 per cent. A few complete regressions are cited. Several instances of long-term recrudescence are also noted. These data emphasize the extreme care that must be exercised in the evaluation of the effect of therapy.

A. H. LETTON, M.D.

In Memoriam

CHARLES CLAY REED, JR.
M.D., F.A.C.S., F.I.C.S.

Dr. Charles Clay Reed, Jr., 42, a surgeon of Little Rock, Arkansas, died at Little Rock hospital on Jan. 5, 1951, after a long illness. Dr. Reed was graduated from the University of Arkansas Medical School in 1933 and served his internship at St. Vincent's Infirmary. His Little Rock practice was begun by an association with Dr. Dewell Gann, with whom he worked until Dr. Gann retired. He was later associated with his father, Dr. C. C. Reed, Sr. until the latter's death several years ago. Dr. Reed was connected in his work with the Baptist State Hospital and St. Vincent's Infirmary. Until entering the army Dr. Reed was deputy coroner for Pulaski County. During the war he was a troopship surgeon.

Dr. Reed was a member of the American Medical Association, the Pulaski County and Arkansas Medical Societies, the American College of Surgeons and the International College of Surgeons.

WILLIAM RICHARD ABBOTT
M.D., F.A.C.S., F.I.C.S.

On March 19, 1951, Dr. William Richard Abbott of Idaho Falls, Idaho, died at the age of 48. Dr. Abbott took his academic college training at the University of Utah and his medical degree from Rush Medical College of the University of Chicago. He served a one-year rotating internship at the Garfield Park Hospital in Chicago. Dr. Abbott was a member of the major staff of the Sacred Heart Hospital and a member of the general staff of the Latter Day Saints Hospital, both in Idaho Falls, Idaho. Dr. Abbott's practice was devoted entirely to general surgery.

In addition to holding a fellowship in the International College of Surgeons, Dr. Abbott was a member of the American Medical Association, the Idaho Falls Medical Society, the Idaho State Medical Society and the American College of Surgeons.

T. E. M. KALIMA
M.D., F.I.C.S. (Hon.)

On May 27, 1951, Dr. Tauno Emil Mikael Kalima, Emeritus Professor of Surgery of the University of Helsinki and President of the Finnish Chapter of the International College of Surgeons, died at the age of 69. A graduate of Helsinki University, Dr. Kalima was assistant to Prof. Ali Krogius from 1912 to 1915. From 1915 to 1928 he was Associate Surgeon at the District Hospital of Turku. Beginning in 1929, he was Professor of Surgery at the University of Helsinki until 1948. His practice was devoted to general surgery, in which field he was many times honored for his achievements.

The distinction of such a man as Professor Kalima, however, is by no means confined to

Prof. T. E. M. Kalima

his professional powers. By all who knew him he was respected and honored for his essential humanity and the quality of his friendship. Even those who knew him only by correspondence were deeply impressed by his kindliness and by the incorruptible concepts upon which his life was based. In Professor Kalima the International College of Surgeons has lost a valuable member, whose wholehearted support of the principles it believes in was always forthcoming, whatever personal inconvenience it entailed.

Professor Kalima was an Honorary Member of the Finnish Surgical Association. He was also a member of the Finnish Medical Society Duodecim, the Nordic Surgical Association, the Nordic Orthopaedic Association, the Deutsche Gesellschaft für Chirurgie, and the Association Francaise de Chirurgie. He was an Honorary Fellow and a member of the Board of Trustees of the International College of Surgeons. There is not one of these groups but will feel his loss. To his bereaved family, friends and colleagues, not only in Finland but wherever his name was known, the College and its *Journal* extend their warmest sympathy.

ROY FERDINAND RAITER

M.D., F.A.C.S., F.I.C.S.

On September 23, 1950, Dr. Roy Ferdinand Raiter, aged 53, died at Cloquet, Minnesota. A graduate of the Northwestern University Medical School, Dr. Raiter studied also at several clinics in Vienna, at the University of Vienna and at Harvard University. His hospital internship was served at the Cincinnati General Hospital. Dr. Raiter was chief surgeon at the Fond du Lac Government Hospital and the Raiter Hospital, both in Cloquet, Minnesota. He was also a member of the staff of St. Mary's Hospital, and St. Luke's Hospital, both in Duluth.

Dr. Raiter was a member of the American Medical Association, the Minnesota Surgical Society, the Minnesota State Medical Society, the Duluth Surgical Society, the American College of Surgeons and the International College of Surgeons. The officers and members of the International College extend their warmest sympathy to the bereaved.

CHARLES MORTIMER ROBBINS

M.D., F.A.C.S., F.I.C.S.

Dr. Charles Mortimer Robbins, 59, of Newark, New Jersey, passed away on April 4, 1951. Born in Lithuania, Dr. Robbins received his medical education at New York University and the Bellevue Medical College. He took short postgraduate courses in Germany, Vienna and Paris, and served his hospital internship at the Newark Beth Israel Hospital, with which he was later associated with as visiting surgeon. For a short period during the war he served in the United States Army as a lieutenant colonel. His practice was devoted entirely to general surgery.

Dr. Robbins was a member of the following medical societies: the American Medical Association, the New Jersey State Society of Surgeons, the American Board of Surgery (founder member), the Academy of Medicine of Northern New Jersey (past president), the American College of Surgeons and the International College of Surgeons.

BERTRAM JAMES MILES

M.D., A.I.C.S.

Dr. Bertram James Miles, Wilkinsburg, Pennsylvania, died on March 15, 1951, at the age of 41. A graduate of the University of Pittsburgh School of Medicine. Dr. Miles served his hospital internship at the Pittsburgh Medical Center. His post graduate work was done over an extended period at the Columbia Hospital, Wilkinsburg, Pennsylvania; Cornell University, New York City; the University of Pittsburgh School of Medicine, and the Cook County Graduate School of Medicine. Dr. Miles was affiliated with the Columbia Hospital as associate surgeon and with the Braddock General Hospital (Braddock, Pennsylvania) on the courtesy surgical staff.

Dr. Miles was a member of the American Medical Association, the Pennsylvania State Medical Society, the Alleghany County Medical Society and the International College of Surgeons.